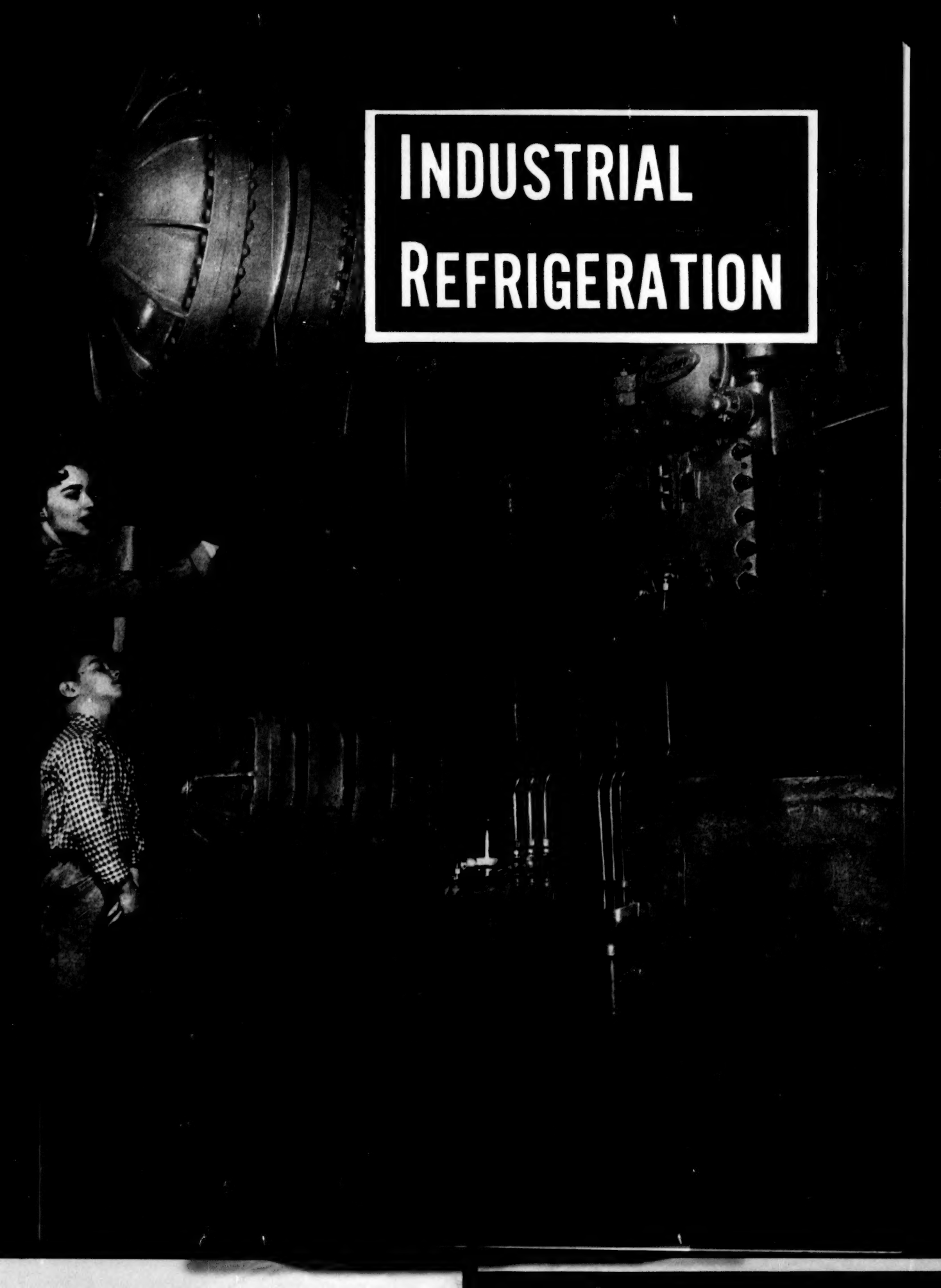

INDUSTRIAL
REFRIGERATION

GET THE OIL THAT'S WAXFREE

Photo courtesy Curtis Refrigerating Machine Division

USE *Texaco Capella Oil (Waxfree)*. The word WAXFREE is right on the container. It is your assurance of an oil that *won't precipitate wax* in systems — not even when temperatures go as low as minus 100° F. You can count on clean operation, high efficiency, low maintenance costs.

Texaco Capella Oil (Waxfree) has outstandingly low haze and floc temperatures, is tops in purity, stability and oxidation-resistance. It does not foam, is moisture-free and compatible with all refrigerants.

There is a complete line of *Texaco Capella Oils (Waxfree)* to meet the requirements of all compressors and operating conditions. In 55-gallon and 5-gallon drums, 1-gallon cans, and the more widely used grades in 1-quart containers — all refinery-sealed to protect purity and quality.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

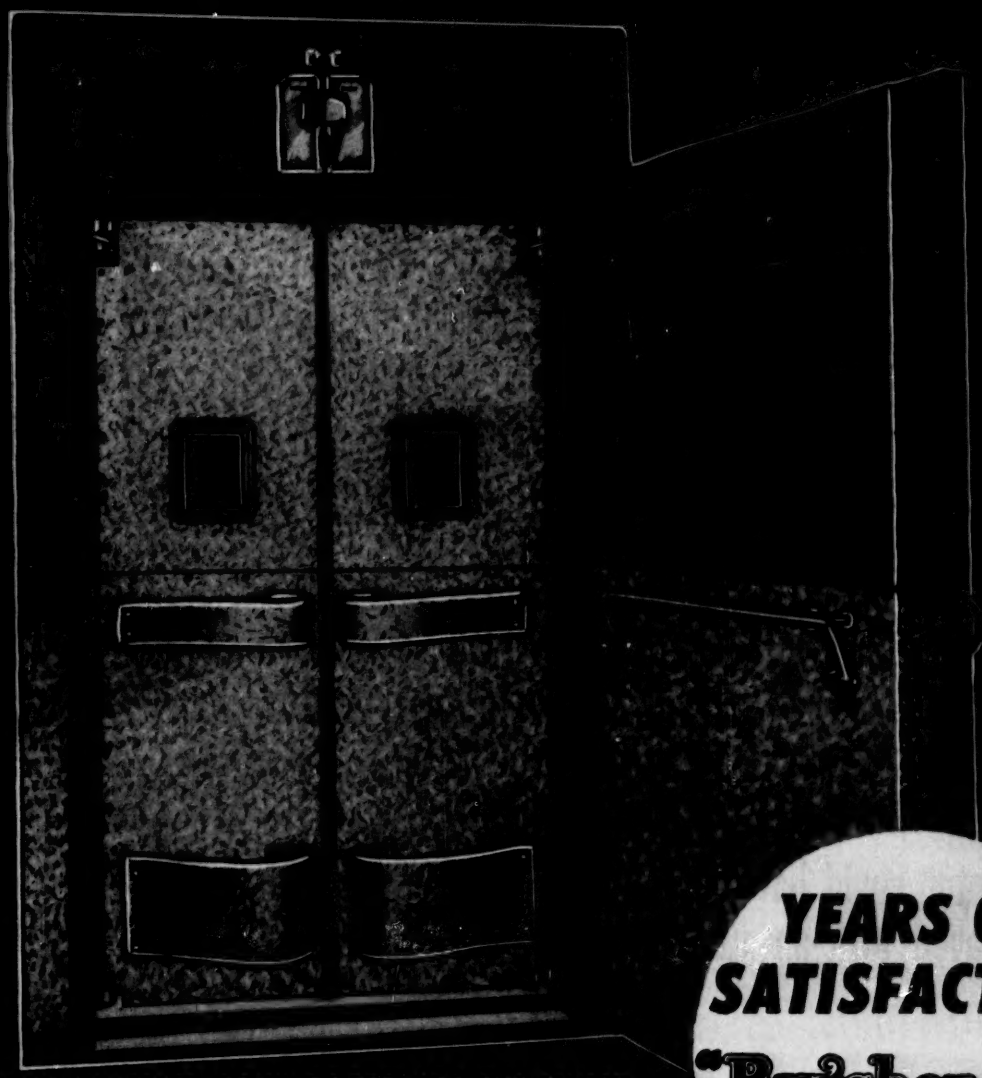
The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Capella Oils (Waxfree)

FOR ALL REFRIGERATING AND AIR CONDITIONING COMPRESSORS

TUNE IN: TEXACO STAR THEATER starring JIMMY DURANTE or DONALD O'CONNOR, on TV Sat. nights. METROPOLITAN OPERA radio broadcasts Sat. afternoons.



VESTIBULE TYPE TRACK DOOR

YEARS OF SATISFACTION

"Butcher Boy"

Quality Since 1885

WHY "BUTCHER BOY" DOORS ARE THE FINEST REFRIGERATOR DOORS BUILT!

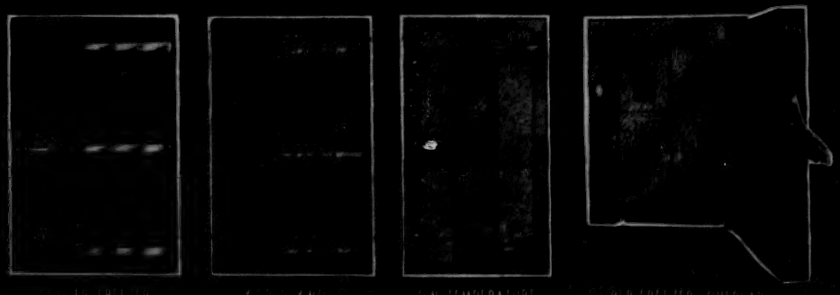
These Exclusive Features Furnished At No Extra Cost

DOOR STRUCTURE

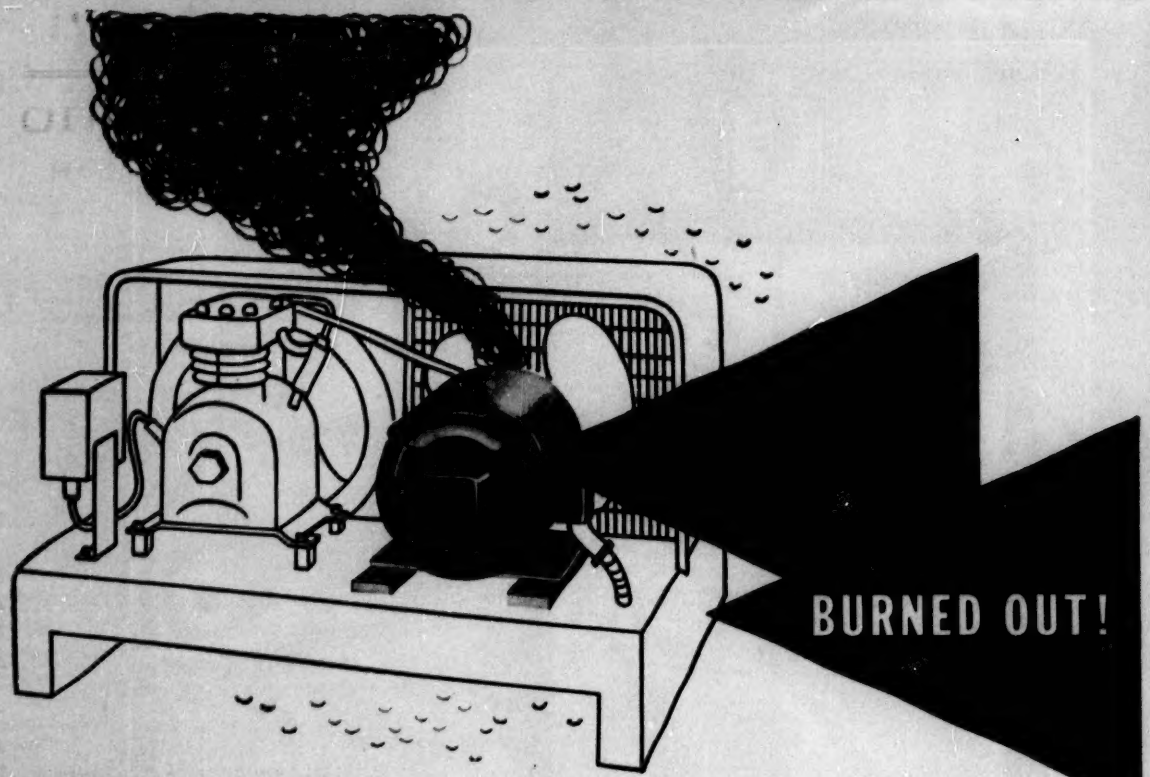
HARDWARE

APPEARANCE

When a Man Thinks Twice ...He Makes Comparisons



BUTCHER BOY REFRIGERATOR DOOR CO. HARVARD, ILLINOIS



BURNED OUT!

This motor could have been saved with an ALCO SUCTION PRESSURE REGULATOR

TYPES 771-772

ENGINEERED FOR SERVICE FOR LIFE

Any electric motor is safe from burnout caused by overloads... if you install an Alco 771 or 772 in the suction line.

They prevent a build-up of excessive pressure at the compressor—add years to motor life—on any system that may be affected by:

- high starting loads
- surges in suction pressure due to load changes
- high suction pressure from hot gas defrost
- prolonged operation at excessive suction pressure
- low voltage and high pressures

SEND FOR BULLETIN 186, WHICH GIVES COMPLETE INFORMATION.

SEE YOUR ALCO WHOLESALER

ALCO VALVE CO.

835 KINGSLAND AVE. • ST. LOUIS 5, MO.

Designers and Manufacturers of Thermostatic Expansion Valves; Evaporator Pressure Regulators; Solenoid Valves; Float Valves; Float Switches.

6318

Refrigerated Barge Article

Pascagoula, Miss.

I RECEIVED my November copy of INDUSTRIAL REFRIGERATION and enjoyed the article on the refrigerated barge. It was gratifying to note that there was very little change from the original article as prepared by our office. We circulated your magazine among the key personnel involved in the construction of this barge and found that it was a topic of major interest.

F. W. PARDOE
Ingalls Shipbuilding Corp.

Sea Water "De-Salted"

A NEW approach to the old problem of taking salt out of sea water has been reported from the University of Texas. The research indicates that water may be made fit for human consumption by freezing it in large quantities.

The armed forces, industry and others now distill salt water to make it usable in areas where there is no fresh water. The University of Texas process is expected to provide fresh water at less cost and with considerable less corrosion and scaling. Freezing salt water causes it to expel the salt. A centrifuge during freezing aids in the process by causing most of the salt to be thrown from the water.

Soviet Order to Japan For Refrigerated Reefers

AN OFFER from Russia to buy 1,000 freezer cars from the Japan Locomotive and Rolling Stock Industry Association was reported in a Japanese newspaper. This order probably would top that of 1948 when Russia purchased 365 locomotives and rolling stock. It would be the first such order since the start of the Korean war.

Ice Machine Wins

WHEN Maddie DeWitt of Penndel, Pa., put a quarter in an automatic Ice machine nothing happened. Peeved, DeWitt shook, then pounded the machine. No ice. Finally, he really got mad and kicked the machine. And then a 100-pound block of ice came down the chute and knocked him down.

Biggest Refrigerator

THE BIGGEST refrigerator in the world will be used to help build a dam in Australia. A glacial moraine forms a natural dam but is too porous to prevent seepage. So it will be frozen with a network of refrigerated pipes.

Industrial Refrigeration

formerly **ICE AND REFRIGERATION**

Now in its 63rd Year of Publication

J. F. NICKERSON, FOUNDER

Vol. 128 **January, 1955** **Number 1**

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The Cover:

An over-awed young engineer receives a few words of instruction from his machinery minded mother on a visit to the machinery plant at Northland Center. Readers can appreciate the size of this 1800 ton condensing-chilling unit from comparing the height of this youngster and his mother to the machinery. See story on page 13.

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What's New

MACHINERY
APPLIANCES • PROCESSES

Rust-Proof Primer

A RUST-PROOF primer has been introduced by Champion Bronze Powder & Paint Company, Chicago, which stresses its rust-proofing qualities which are a result of a chemical reaction that takes place when the product is applied to a rusting surface. This chemical development, it is claimed, creates a special pigment from

the interaction of the primer with rust particles. The result is an effective stoppage of further rust formation and a tremendous covering capacity for rust-proof primer. Maintenance problems around plant, shop or yard also establish many uses for rust-proof primer; storage tanks, structural iron work, outdoor equipment, etc., can all be protected for longer service life. It is available in pint, quart and gallon cans and also in bulk.

New Gauge Determines Blower Speed

MANUFACTURERS of residential air conditioning systems stress the extreme importance of achieving the correct air flow across the system's evaporator. The only practical way of determining this (out on the job) is to measure the static pressure drop across the evaporator.

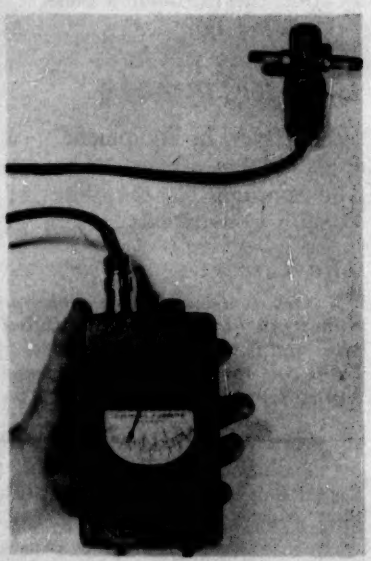
New Dwyer gauge for determining blower speed

Designed to do that, the Dwyer Gauge No. 172 provides a tool-kit-size instrument that is quickly attached or detached, is break-proof and permanently accurate. It measures 0 to 1 inch water pressure on a 3 inch scale calibrated in .02 inch divisions. It is manufactured by F. W. Dwyer Manufacturing Co., 317 So. Western Avenue, Chicago, Ill.

Most manufacturers specify the exact pressure drop (measured in inches of water) at which each evaporator of their make is designed to operate. Thus it is a simple matter to attach Dwyer Gauge No. 172 and adjust blower speed until the pressure drop reading corresponds with the manufacturer's recommendation.

Electronic Flowmeter Fits Palm Of Hand

THE HASTINGS Electronic Flowmeter for instantaneous direct readings of gas flow in 50 to 10,000 c.c. per min range from an indicator small enough to be held in the palm of the hand, is announced. The new 27 ounce unit is designed by Hastings Instrument Co. Inc. Warwick, Virginia, for such applications as process control and quick line checks.



The Hastings Electronic Flowmeter

Directly-heated thermocouple tube can be placed in a line for low flow rates with practically no pressure drop in line. Logarithmic calibration provides ease of reading in low flow ranges. Response time claimed is ½ second, and accuracy at two percent.

Instrument may also be calibrated for measurement of mass flow in pounds of air or gas. The manufacturer states that an index curve can be furnished which will make the meter suitably adaptable for reading refrigerant gas flow, such as "Freons". However, the instrument is not designed for recording liquid flow, refrigerant or otherwise.

New Soldering Gun

A NEW soldering gun was introduced by the Wen Products Inc. Chicago, Ill. at the National Electronic Parts Show in Chicago. The gun is designed for both shop and production line and is so small it slips readily into a tool kit. Weight is 1½ pounds. It plugs into an ordinary 110-120 volt a c 60-cycle current and is working hot 2½ seconds after trigger is

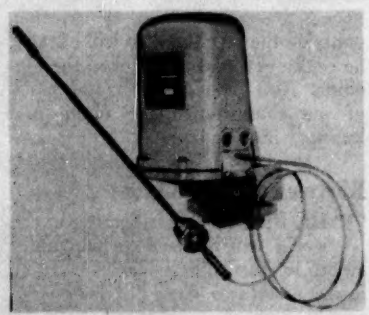
New Wen Products Soldering Gun

pressed. It cools quickly when trigger is released. A spotlight automatically illuminates work and new type extra long nosed tip enables one to reach into tight spots. The new type tips are reported to be indestructible. A well balanced tool, it has styled, cherry red plastic handle and case.

New Instrument Records Process Temperatures

A NEW instrument which accurately measures process temperatures and pneumatically transmits the information to a central recording or controlling station has been announced by The Foxboro Company of Foxboro, Mass. Known as the Model 12A Temperature Transmitter, it is a nonindicating device of the "force balance" type with a calibrated accuracy of ½ percent of the temperature span and compensated for ambient temperature and barometric pressure variations.

Of rugged construction and simple in operation, the new transmitter is designed around a gas filled thermal system which exerts force on a flapper-nozzle mechanism



New Foxboro model 12A Temperature Transmitter with stainless steel capillary and bulb.

in proportion to the measured temperature. The resulting back pressure in the nozzle circuit, amplified through a relay and converted to a force through a bellows, quickly balances out the initial force and constitutes the 3-15 psi output transmitted by low cost tubing to the receiving instrument.

Spans ranging from 50 F. to 400 F. are available and can be utilized between the limits of minus 100 F. and 1000 F. Three and a half feet of Geon-protected capillary tubing connects temperature bulb to transmitter. A block and clamp mounting arrangement rigidly secures the seven pound instrument to any vertical or horizontal pipe or to a flat surface. The instrument is completely weatherproof, permitting installation in hazardous or corrosive outdoor areas.

New Soldering Paste

A NEW solder paste for sweat soldering or tinning, known as "SweTite" is announced by Alpha Metals, Inc. The paste

Showing Application of SweTite paste solder

consists of a blend of 50/50 powdered solder and an active flux. For most applications cleaning is unnecessary. The paste is applied with brush or cloth, the parts fitted together, and heat applied. After heating the small amount of flux residue can be removed by wiping the joint with a damp cloth.

The joints obtained by this method, it is claimed, are as strong as those obtained by the conventional methods using a separate flux and solid wire. The fact that flux and solder completely cover the whole surface of the metals being joined insures a complete coverage and eliminates untinned spots.

The technique is easily mastered. The time required for making a joint is considerably reduced because flux and solder are applied in one operation instead of separately. The number of joints which can be made from one pound of "SweTite" exceeds the number which can be made from solid wire and flux of the same cost. It is supplied in ½ pound and 1 pound cans with a brush for each can.

Creamery Package Announces "VS" Ammonia Compressor

BILLED as the "Shape of Things to come", The Creamery Package Mfg. Company of Chicago displayed three of their new "VS" compressors at the Dairy Industries Exposition in Atlantic City.

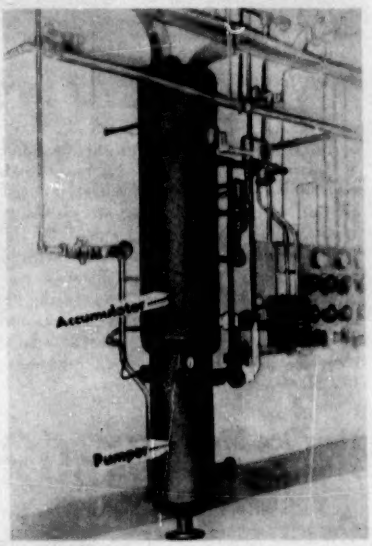
Featuring twin one piece "V" cylinder and crank case blocks with removable end frames and integral manifolds, the compressors have all of the features of the company's established Type "K" line, including water jackets, force feed lubrication, safety pistons, separable cylinder blocks, cleanable oil filter, oil level indicator and oil pressure failure switch. The novel design in which the cylinders and crank case blocks are sandwiched between end sections with joints at right angles to the shaft axis gives maximum accessibility with great compactness.

Together with the larger CP Type "K" machines Creamery Package can now offer a complete modern line of ammonia compressors from the smallest to 250 hp.

Exhibit of Creamery Package at Dairy Industries Exposition. Three new "VS" Ammonia Compressors are displayed for the first time. In background: CP Duplex Booster and Second Stage Compressor with intercooler and oil separator.

New Liquid Refrigerant Circulator Now Available

THE new liquid refrigerant recirculator introduced by The J. E. Watkins Company, Maywood, Ill., is designed to force all evaporators to maximum efficiency with positive full-flooding. An evaporator coil in the usual plant, suggests R. B. Bass, sales manager of the company, contains restricted, slow-moving refrigerant. Oil carried over with the liquid is trapped in the coil and is difficult to remove. The re-



Liquid Refrigerant Recirculator made by J. E. Watkins Company.

frigerant feed is restricted because the plant engineer must pinch down on the expansion valve to be sure that slugs of liquid refrigerant will not come out of the coil and cause serious damage to the compressor.

On the other hand, the recirculator connects between the evaporators and the compressor, into commercial or industrial refrigeration systems of any tonnage. It provides full protection to the compressor, catches the excess (sub-cooled) liquid, and recirculates it under pressure to the evaporators through the expansion valves. It is claimed to be particularly effective in low temperature applications. It permits the use of a smaller compressor, not only because of the high efficiency from using sprays, but also from elimination of a statistic liquid head and elimination (in the case of ammonia) of superheat in the gas being compressed.

Lightweight Fire Retardant Insulation Finish Developed

FIRE-BAN, an all mineral chemical cement for protection of insulation surfaces against fire, vermin and fungi, has been rated, approved and listed by Underwriter's Laboratories, Inc., in April, 1954. This material (improved Neillcrete) was developed six years ago by the E. H. O'Neill Floors Co., Chicago for fire-proofing wood or timber structures, and is similar in composition and application to magnesite flooring materials.

New Heavy Duty Steel Electrical Conduit

A NEW heavy-duty rigid steel electrical conduit, Superduct, especially designed to provide extraordinarily long life under very severe corrosive atmospheres such as are found in the refrigeration industry has been developed by National Electric Products Corporation, Pittsburgh, Pa.

Short section of new heavy duty electrical conduit

Tests have shown how the new conduit withstands the attacks of sulphuric acid, caustic lye, salt spray, and heat in comparison with other types of corrosion-resistant conduit. It is galvanized by the Sherardizing process, then coated with a special vinyl chloride copolymer, pigmented and plasticized enamel finish, inside and out. This new finish protects the galvanized conduit against the unusually corrosive influences common in refrigerating plants.

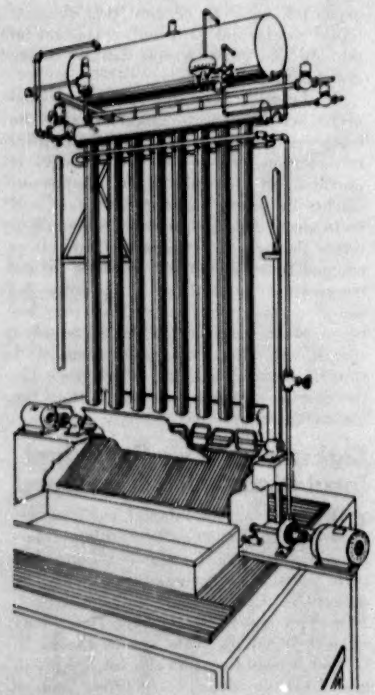
New Ice Maker Produces Shell Ice

AN IMPROVED method of making ice with ammonia or Freon under direct expansion is announced by the Frick Company. The product, known as Shell-ice, is frozen in layers ⅛ to ½ inch thick on vertical tubes, and when thawed loose is broken into pieces of varying sizes.

Installation is simplified because the ice maker is a built-up unit. The operation is both simple and automatic, and the initial cost is low in comparison with other ice making systems. Dairies, poultrymen, fruit and vegetable packers, fishing boats, hotels, restaurants, and numerous other businesses use fragmented Shell-ice to advantage.

Shell-ice makers are built in 12 sizes, from ½ to 30 tons daily capacity, and are offered for sale in all countries. Production of the units has already been started in the Frick factory at Waynesboro, Pa. The equipment is described in Frick Bulletin No. 54.

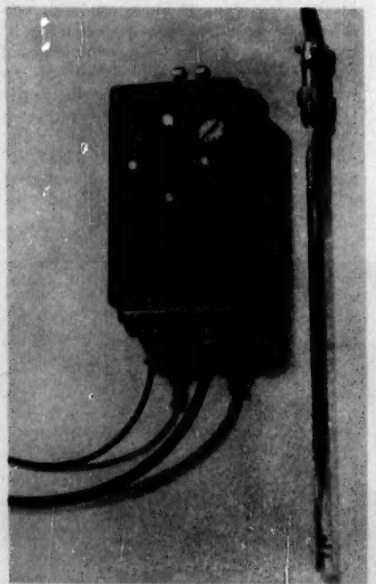
This development is made possible by a manufacturing and sales license under the patents applied for by M. S. Chapman of Wheeling, West Virginia, who has over 30 installations in sucessful operation throughout the country.



Diagrammatic View of New Shell-ice Maker

Capacitive Level Control By Thermo Instruments

EQUIPMENT designed to provide a link between the capacitive-type electronic level-sensing equipment and the corresponding actuation of pneumatic control valves or other instrumentation is described in a new leaflet, Form CP2 by Thermo Instruments Co. The Belmont Level Control Model DP, utilizes an inert capacitive-type sensing probe suspended in the material to be controlled, and electronic control circuits which operate a pneumatic pilot valve.



Model DP level Control Thermo Instrument Co.

The literature shows in schematic form how the resulting pressure changes can either be used directly to operate a diaphragm control valve, or can be fed into auxiliary automatic or manual control equipment where the pneumatic valve requires greater air volumes.

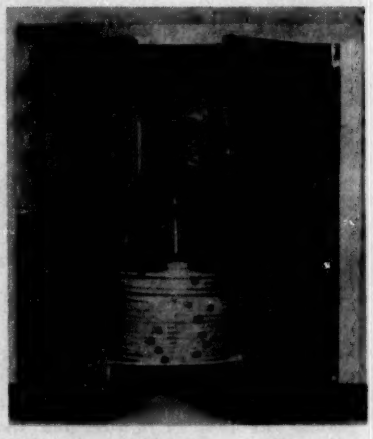
Applicable to most non-adhesive chemicals, milk, oils, refrigerants such as ammonia and the Freons, and all condensed gases over a temperature range from 500 to −425F, the control is capable of being operated in applications ranging from high vacuum to pressures as great as 100,000 psi. The probe is connected by coaxial cable to the electronic circuitry which can be located as far as 1,000 feet from the sensing point.

Responding to a rising or falling level around the probe, the electronic unit actuates an air-pilot valve which modulates a 15— psi air supply over a range from three to 15 psi. This pneumatic signal can be used directly to actuate small control valves or, where greater volumes of air necessary, can be fed into auxiliary control equipment. Units can be supplied for operation such that the main valve either opens or closes with increased pressure.

Housed in a sturdy industrial-type cast-aluminum box 6½ by 11½ by 4 inches in dimensions, the control unit includes a meter for observation of the output of the electronic control unit, and an air-pressure indicating instrument for observation of valve operation. Panel-front controls located under screw-on dust-protective caps provide for coarse level adjustment, fine level adjustment, and differential in range of control. The complete instrument packed for shipment weighs 18 pounds.

New Flexible Door For Warehouses

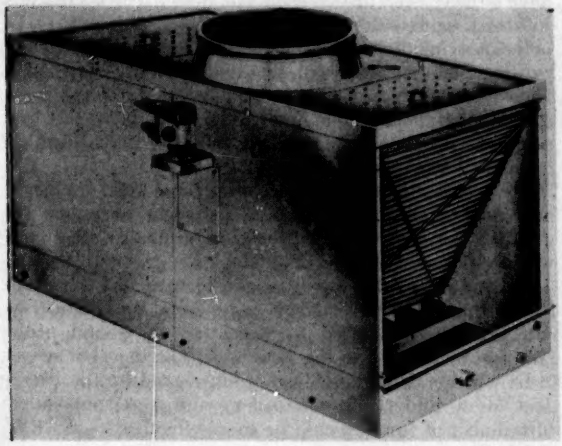
A NEW door for warehousing and industrial uses has been originated by The Rubbair Door Division of the Stic-Klip Manufacturing Co., Inc., Cambridge, Mass. "Rubbair Doors", as they are known, are used between refrigerators and packing rooms, preparation and sales areas, loading docks and warehouses; between any two points that require double-action doors or temperature control. They are flexible and lightweight. Their rubber construction prevents injury to loads, pallets, trucks and personnel; speeds traffic of materials and equipment; provides good insulation and reduces shock, noise and industrial fatigue, according to the manufacturer.



The New Rubbair Door in Operation

Marley Announces New Double-Flow Aquatower

WITH the introduction of its new Packaged Steel Double-Flow Aquatower, The Marley Company, Kansas City, Missouri has expanded the "packaged" Aquatower line to accommodate any water cooling job from 2 to 100 tons. This new addition to the Marley line, pictured here, is designed for water cooling loads in the 60 to 100 ton range. Although designed primarily for air conditioning and refrigeration applications, the Packaged Double-Flow Aquatower is suitable for industrial water cooling.



New Packaged Steel Double-Flow Aquatower

Packaged Steel Double-Flow Aquatowers are factory assembled in three sub-assemblies which can be safely shipped, easily hoisted and quickly assembled in the field. Erection time that formerly required days for a tower of this capacity now requires only hours, effecting a great saving in erection costs.

This new line is equipped with Marley multi-blade, cast aluminum, adjustable pitch fans with V-belt drive; casing and basins are fabricated from heavy gage steel. Interoir surfaces are completely protected with corrosion-resistant Marmastic. Exterior is painted with zinc chromate primer and a heavy coat of aluminum paint.

Other new design features include self-cleaning cold water basin, new Marley nail-less filling, and simplified piping and grilling requirements.

Liquid Zinc For Rust Control

A NEW, simplified and much-advanced way to prevent rust on farm machinery and implements as well as on gutters, corrugated roofing, other metal building materials, and any iron or steel surfaces, is now available through Constad Laboratories, New York City. The product is Zinktron, a laboratory-developed method of surface protection which is as easily applied as paint right over the rusted surface. The manufacturer claims that the coating offers all the advantages of "hot dip" galvanizing with none of the expense or inconvenience. Zinktron is applied with paint brush or spray gun. A gallon covers 450 square feet. Zinktron takes only one hour to dry.

New Steel Hardens At Low Temperatures

A NEW steel, produced with the aid of refrigeration, has been announced by the Allegheny Ludlum Steel Corporation. The airplane makers wanted a stainless steel that could be easily formed and then hardened at temperatures low enough to avoid scale and distortion. Allegheny, having worked at the problem for years, has come up with an alloy of chromium, nickel and molybdenum with low carbon steel. Formed, the part is hardened at temperatures 8 to 100 degrees below zero. It is called Allegheny Metal 350.

WHICH DO YOU NEED?

INDICATORS—

TAYLOR DIAL THERMOMETERS

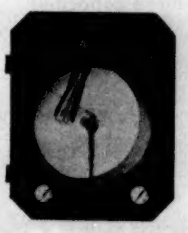
For **cold storage rooms, bunker rooms, brine tanks** and other applications where periodic reference is required and a continuous record is not considered essential.

RECORDERS—

PORTABLE RECORDING THERMOMETER

For **storage rooms, processing rooms, refrigerating rooms,** etc. A self-contained Taylor Recording Thermometer to check air temperatures in various rooms.

CONTROLLERS—



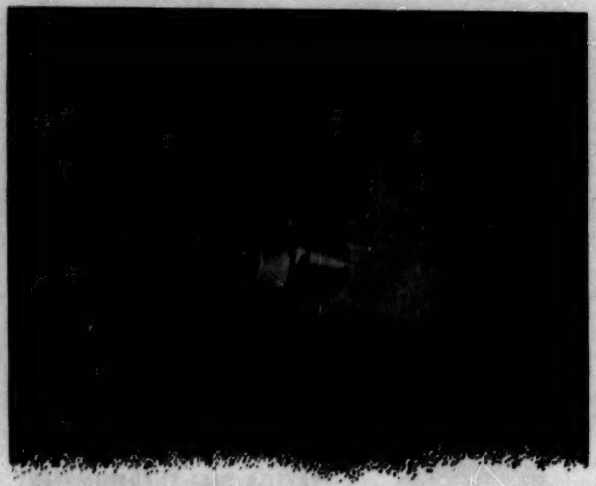
TAYLOR FULSCOPE CONTROLLER

For **tanks, brine lines, compressors,** etc. Probably the most versatile instrument made for temperature, pressure, flow and liquid level control. Easily adaptable to any operating conditions.

TAYLOR'S CATALOG FOR REFRIGERATION INDUSTRY

Write today for Taylor's Catalog 300, giving details on how these instruments, and many more, can cut costs, give new efficiency on refrigeration problems. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST



Announcing

EXTRA LARGE

Capacity...

THERMOBANK

for Freon and Ammonia

NOW...no job is too large for the KRAMER THERMOBANK

The only completely automatic system for freezing temperatures offering these extra large capacities. THERMOBANK requires no manual attention whatsoever.

Ceiling mounted, THERMOBANK takes no precious floor space. You can store products directly under the unit.

Can be used as an independent system or with an existing large system without affecting the operation of other evaporators.

WRITE FOR BULLETIN TA249-F

KRAMER TRENTON CO.
Trenton 5, N.J.

PRESS BRIEFS

Washington Moves to Reduce Government in Business

THE BUREAU of the Budget is reported to be calling upon all departments and agencies to list all of their business activities: (1) those that are now in operation; (2) those that are on a stand-by basis; (3) those that have already been disposed of. The directive ordering this information is said to be prefaced by a statement of policy, saying that Government should get out of competitive business, and will reportedly be presented to a November Cabinet meeting for approval. Lists are to be submitted by March or April 1955. It will be the first complete roster of Government business activities that has ever been made.

Meanwhile, the Departments of Defense and Commerce are collaborating on their own statement of policy regarding Government-in-business. Presumably that too will be discussed by the Cabinet.

Reason for all this top-brass consideration of the problem is that most Government commercial and industrial enterprises were started by executive order and probably can be stopped in the same way. The question seems to be whether a White House order, signed by the President, or a Budget Bureau order, with a recommended curtailment of funds, would be more effective. — NARW Quick Sheet.

United States Buying More Whalemeat

U. S. IMPORTS of Norwegian deep-frozen whalemeat have more than doubled since 1953, reports John Bergstad of Brooklyn, N.Y., who represents several packers in Norway. Recently 300,000 pounds arrived in New York aboard the Norwegian American Liner M. S. Ranenfjord.

In 1952, a mere 60,000 pounds of Norwegian whalemeat entered USA. Last year, the total was 700,000 pounds, and this year, it is more than 2,000,000 pounds. Most of it is used to feed animals, especially minks. Fed on whalemeat, minks develop an especially rich fur. For human consumption, whalemeat tenderloin comes in one-pound packages of which 20,000 pounds have been imported in 1954.

All of the whalemeat coming here from Norway stems from animals caught in the North Atlantic by catchers operating from four shore bases. During the 1954 season, Norwegians landed a total of 3,200 small whales. Except for July, the season extends from April to October 30.

Minute Maid Buys Snow Crop

MINUTE Maid Corporation, one of the nation's biggest producers of frozen citrus concentrate, has purchased the Snow Crop division of Clinton Foods, Inc. The acquisition will add to Minute Maid's products a complete line of frozen fruits, vegetables, fish and poultry. Inventory and fixed assets of Snow Crop's frozen foods and citrus business were included in the sale. John Fox, president of Minute Maid, said the Snow Crop name would be maintained under the new setup. He said there would be no major changes in Snow Crop's operating or sales personnel or its distribution channels.

The Journal of Commerce reports that this second big consolidation in the frozen foods industry within a year, may be the forerunner of further such transactions.

New Refrigerator Cars For Arabian Desert

TRANSPORTING frozen foods across the Arabian Desert will become an every day occurrence in the near future. Two prototype refrigerator cars in the course of manufacture by the Societe Gregg D'Europe, S. A. Lot near Brussels, Belgium, associates of the Gregg Car Company, Ltd., New York, will be equipped with the first four two-stage low temperature refrigeration compressors to be used for railroad refrigerator cars.

Aramco engineers had determined that two-stage compressors would be required because of the extremely high ambient temperatures prevailing throughout Arabia during most of the year and, consequently, excessive compression ratios would have been encountered had the usual domestic practice using a single-stage unit been followed. According to Nathan A. Gardner, manager of Worthington's Air Conditioning and Refrigeration export department, the two-stage compressors are unique for this type of application. These reciprocating refrigeration compressors were built by Worthington Corporation, manufacturers of the diesel engines already at work in the trans-Arabian pipeline stations.

The refrigerator cars are being manufactured for use on the Saudi Government Railroad which connects the Port of Dammam on the Persian Gulf with the capital city of Riyadh, a distance of approximately 360 miles. This railway line, with stations near the Arabian American Oil Company's major oil producing centers, will thus soon provide increasing quantities of frozen foods to the area hitherto serviced only by refrigerated truck transport.

Dairy Companies Merge

MERGER of Shady Lawn Creamery with Young's Dairy, Walla Walla, Wash., effective December 1 was announced by Wallace Young. Operations at the two locations will be continued in the future. All milk processing and packaging will be done at the Young's Dairy plant where routes will originate. Manufacture of ice cream and butter will be continued at the Shady Lawn plant. John A. Emigh, Jr. will be in charge of manufacturing at the Shady Lawn plant, according to Mr. Young.

Frozen Food Prospects

SPEAKING to Tri-State Freezers on December 2, L. S. Martin, secretary-manager, National Association of Frozen Food Packers, reported a promising outlook for marketing this year's frozen packs. Basis for his optimism is the expectation that demand for frozen fruits and vegetables will continue to expand, while over-all supply remains the same as a year ago. NAFFP says that it appears that supplies of most products are generally well balanced against expected market requirements, except in a few cases of definite shortages. — NARW Cold Facts

City Products Buys Florida Ice Plants

THE acquisition of 29 ice manufacturing plants from the Florida Power & Light Company has been announced by City Products Corp., Chicago. Wm. J. Sinek, City Products president said the new plants will supplement the operations of its own plants in Florida and that the company will be better able to serve the refrigeration requirements of the state's citrus and vegetable industries.

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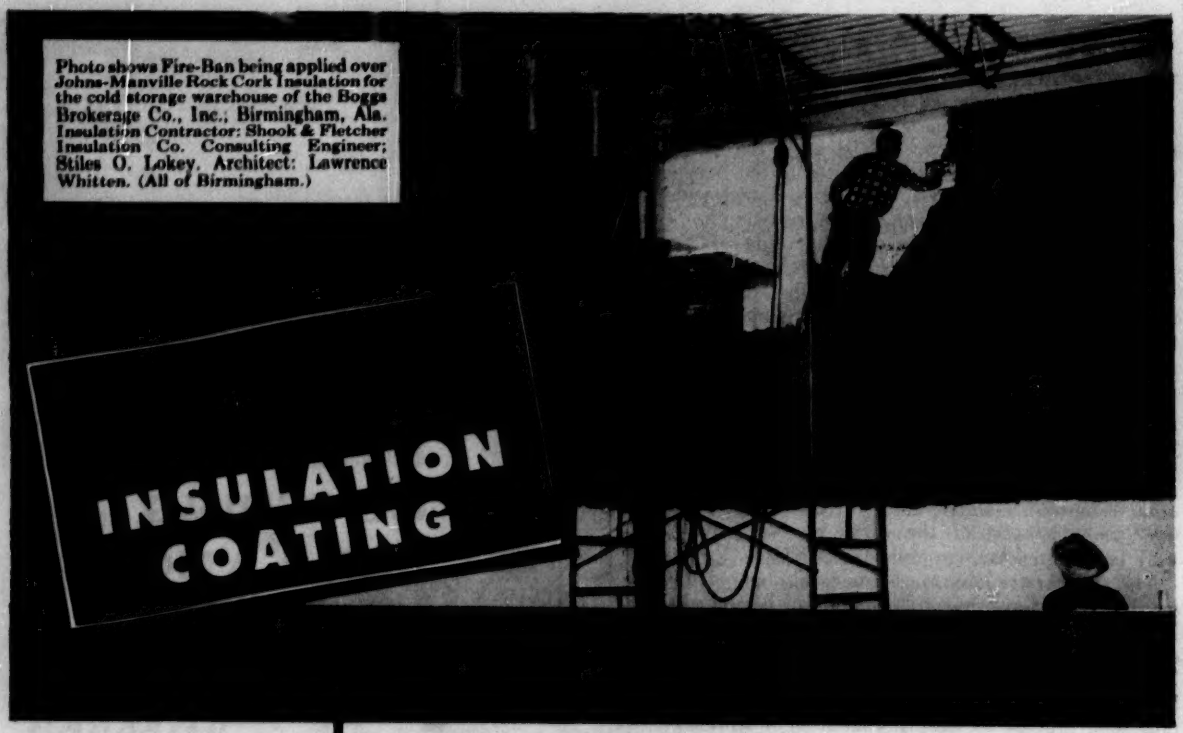

Photo shows Fire-Ban being applied over Johns-Manville Rock Cork Insulation for the cold storage warehouse of the Boggs Brokerage Co., Inc., Birmingham, Ala. Insulation Contractor: Shook & Fletcher Insulation Co. Consulting Engineer; Stiles O. Lokey. Architect: Lawrence Whitten. (All of Birmingham.)

for application on Corkboard, Foamglas, Styrofoam, Rock Cork, Fiberglas, Rubatex, etc. Applied in One Coat by trowel, spray or brush to Walls, Ceilings, Ducts, Tanks, Pipes, etc. Thoroughly "field-tested" for more than eight years.

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Apply Fire-Ban for permanent customer satisfaction. Shelflife enables stocking. Packaged for economical handling. Our engineers cooperate to insure your success and profit; provide free samples for any job. Full details upon request.

● **APPLIED IN ONE COAT** 1/16" to 1/4" thickness. *Provides fire-retardant protection to premises and impact-resistant protection to insulation.* Will not curl, blister, check, craze, flake or peel.

EXTREMELY LIGHT WEIGHT. Minimizes strain on backing adhesives; important, particularly on ceiling applications.

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WHITE COLOR gives high (80%) light reflectivity. Thirteen other colors are available for decorative treatments. Colors are permanent, require no painting or maintenance. Color and surface textures are not affected by repeated washings or humidity changes.

FIRE-BAN does not freeze, enabling application under low temperature conditions. It is not affected by temperature fluctuations from —100°F. to +225°F.

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In the Spotlight

A STRIKING example of the trend toward suburban building of community shopping centers is the development at Northland Center, Detroit. Here from a modern five-level department store building, eighty tenants are supplied with refrigeration and air conditioning service, along with other utilities. Four 1000 hp units supply 3600 tons of refrigeration for the first stage of the project. Details of this unusual development are given in the article starting on page 13.

THE COMMERCIAL storage of fruits, vegetables, florist and nursery stocks discussed in a recent Bulletin of the U.S.Dept. of Agriculture will be of interest to refrigeration warehousemen. It covers temperature and humidity of storage rooms, cold and freezing injury, storage of cut flowers and related aspects of the subject. The Bulletin is reviewed in article on page 18.

SUB-ZERO temperatures for treatment of metals result in increase in hardness, volume, and magnetic intensity, plus greater stability. It also makes possible shrink-fit assemblies that previously required tons of pressure. Other important advantages and the technical phases of this process are discussed in the article on page 19.

A SURVEY of ice rinks developed some interesting information on piping and other construction details. It shows that piping if properly installed and maintained will give long dependable service, the facts being collected from a questionnaire to ice rink operators. Additional information, of practical interest to rink owners, is included in the article on page 27.

OFFICERS of the American Society of Refrigerating Engineers were installed at the recent annual meeting of the Society and announcement was made of the appointment of a new Executive Secretary and a Director of Publications. Brief sketches of this new personnel are included in the article on page 23.

THE ANNUAL Fact Finding Conference of the Institute of American Poultry Industries to be held February 11-13 will be based largely on practical workshops on production, procurement, processing, merchandising, sales and profits. For details see article on page 24.

THE AIR COOLED condenser has been slow in acceptance by the industry because of absence of information about its performance and other factors. But tests and field experiences have shown that it can produce economical results, with freedom from certain problems. Its unfavorable as well as favorable factors are fully discussed in the article on page 24.

COMMERCIAL adoption of dehydro-freezing with certain fruits and vegetables is well under way, according to the Western Utilization Research Branch, Agricultural Research Service of the U.S. Dept. of Agriculture. The new process renders some sound fruits, sorted from processing lines, that can be used in juices or puree. This report is reviewed on page 30.

WHILE under vacuum the lower head of a large tank used for evaporation of orange juice collapsed with such damage that it had to be replaced. For details see page 28.

THE BUSINESS side of Engineering is discussed in the article on page 31 by a leading consulting refrigeration engineer. The author, in addition to his technical background, says he has acquired a great deal of information and some measure of understanding of this subject which has been of great value to him. He offers this as equal worth to practical engineers.

A SHOWROOM has been added to the appliance division of The Colorado Ice & Cold Storage Company, where kitchen and other home appliances, including refrigerators, are sold. Details are given in the article on page 29.

AN INDOOR ice skating rink has been maintained by the board of park commissioners of Wauwatosa, Wisc., for many years for skating and curling. The upkeep of this rink is described in article on page 43.

THE RESEARCH and Development facilities of the Army Quartermaster Corps have been combined at a new center in Natick, Mass. A biographical sketch and group photograph of the refrigeration equipment branch of the Mechanical Engineering Division are shown in the article on page 21.

FREEZING AND cold shipment methods have done for the Florida fish industry what frozen concentrates have done for citrus fruits. A review of the situation is given, with special reference to the growing shrimp fishing industry, in the article on page 48.

A WATER-SAVING edict passed by the Board of Water Commissioners of Denver, Colo., will bring to a complete halt the use of cooling towers and condensers in air conditioning installations. For details see page 49.

THE COST of room air conditioning will not be less next year, and probably will be more is the opinion of manufacturers.

Cut Refrigeration POWER COST

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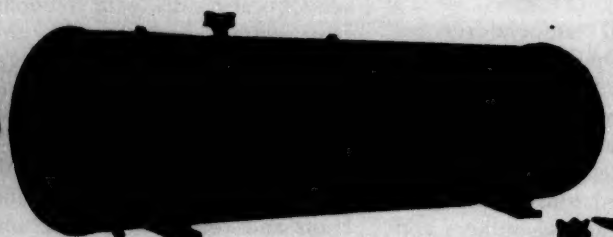
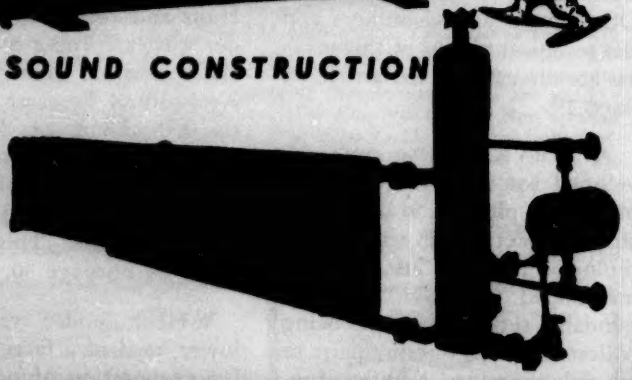


CORRECT DESIGN — SOUND CONSTRUCTION

COIL TYPE



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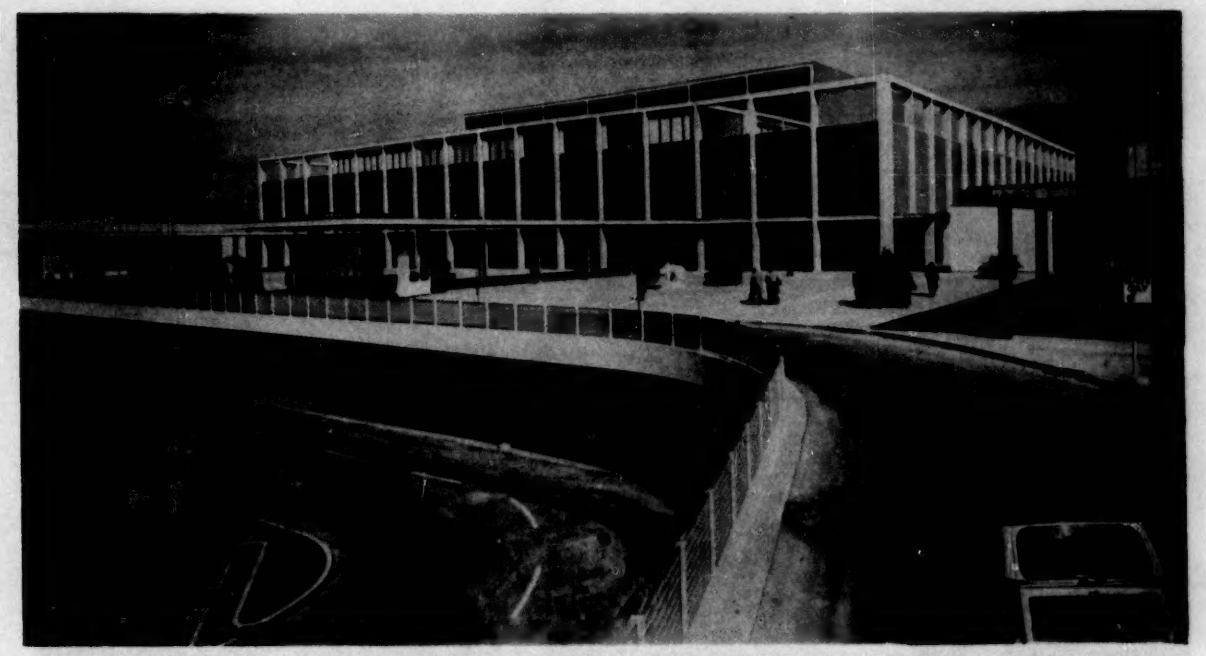


View of Hudson's Northland new four-level department store of the J. L. Hudson Company, Detroit, Michigan. Customer convenience parcel pick-up is located on the left lower level. Public transportation approach is on the level above. There is a tunnel encompassing the store for truck access and warehousing. The store is completely air conditioned. Fresh air intake louvres may be noted in the penthouse on top of the department store.

Tenants Purchase Refrigeration Service In Large Shopping Center

J. R. KELAHAN
Technical Editor
Industrial Refrigeration

With the trend toward suburban building of community shopping centers, Northland Center, Detroit, a development by one of the nation's largest department stores, sells refrigeration service to 80 tenants as a utility along with other services.

A DEVELOPMENT corporation at Detroit, Mich. provides chilled water to its shopping center tenants for air conditioning and refrigeration. This chilled water consumption is metered and the tenants are invoiced in a manner similar to public utility water, light and gas services.

This industrial application is at Northland Center, Inc. The corporation's refrigeration plant chills water supplied to air-condition 80 stores. This commercial use actually makes the refrigeration a utility, a service provided by the Center management.

According to officers of the Center, the refrigeration plant involves what is believed to be the largest centrifugal refrigeration compressing-condensing-chilling units in this field of application; that is, the largest refrigerating system in a single machine room ever provided for comfort air-conditioning of commercial buildings. Two 1800-ton, 2000 hp each, Carrier Corp., apparatus, chills 6000 gpm of water at full capacity from 55 F to 40 F.

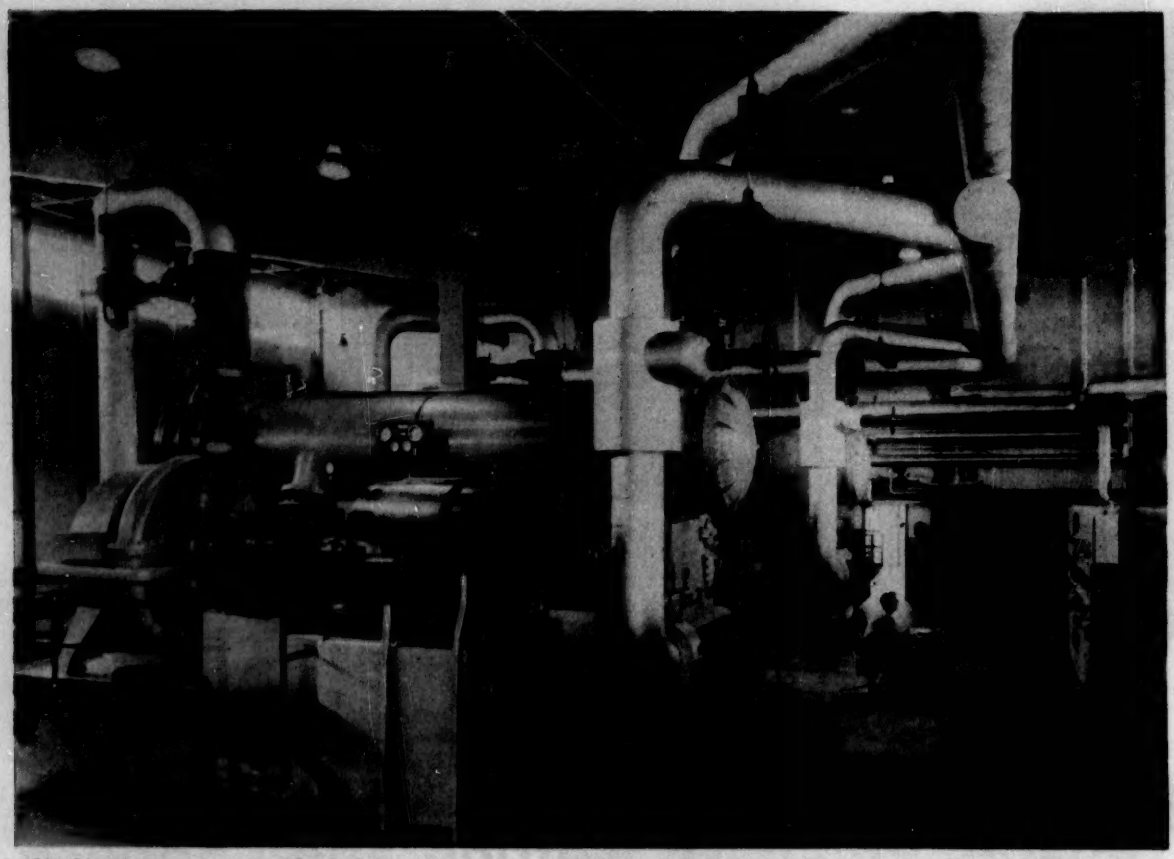
The existing plant and service for approximately 80 tenants is only the first stage of this gigantic commercial project. The present system serves six buildings. Expansion possibilities are built in at the Center and the development company may construct two more buildings for retail stores, plus several multiple occupancy buildings. The additional refrigeration equipment to be installed for these units will bring the total tonnage to 7200, and the horsepower to 8000.

Owner and operator of this new utility is Northland Center, Inc. A subsidiary of the J. L. Hudson Company, one of the nation's leading department stores.

Suburban Shopping Center

The commercial activity of this development is to serve principally as a suburban shopping center. It is located northwest of the Detroit city limits. Land and present building construction of the 161-acre site with its 20 acres of buildings has run in excess of 30 million dollars. The Center contains everything from a portrait studio to a delicatessen. A 450-

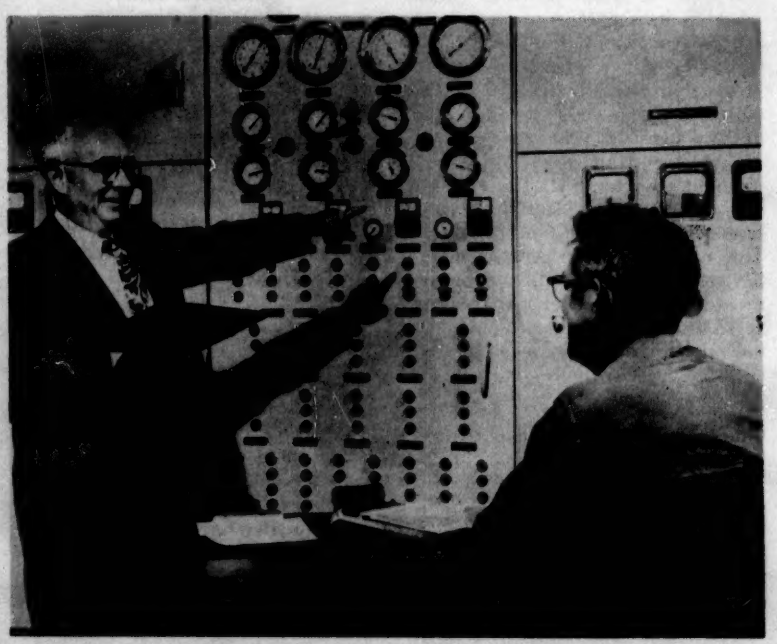
INDUSTRIAL REFRIGERATION acknowledges the assistance of the following individuals for facts gathered in connection with this story: Charles Rouse, Northland's chief engineer; A. P. Bencks, sales director; Jim H. Kelly and Arne Leppanen, H. E. Beyster Associates; Al Petronis, Carrier Corporation, Detroit; Horace Carpenter, Jr., vice-president, Northland; Leo C. Gage and Leon L. Adams, Detroit Chapter, NAPRE.



Machinery room at Northland Center, Inc. Pictured are the two 1800-ton chillers, each equipped with two 900-ton centrifugal compressors and 1000 hp induction motors. Auxiliaries are behind and one level below the main refrigeration plant. To the right of the operator's desk is the main control panel from which he manipulates the entire refrigeration plant and its auxiliaries. Two automatic purgers are located at either side of the main control panel. The electric distribution panel is at the extreme right. On the other side of the panels are three 100 hp high pressure boilers and their automatic controls.

chair Stouffer restaurant occupies one corner of the site. It even supports its own fire department.

Business activities employ over 3000 persons. There are 8344 car parking spaces covering 70 acres with parcel pick-up service for the convenience of Kroger and Hudson customers. An underground service tunnel and individual tenant de-



Charles Rouse, chief engineer, Northland Center, Inc., passes a few instructions or remarks on to one of the Center's operating engineers. Four 900-ton compressors, two for each 1800 ton chiller, plus circulating water pumps and all auxiliaries may be controlled from the board pictured. The operator does not have to leave the station to start or stop the plant, to increase or diminish capacity.

livery platforms provide trucking facilities to the tenants. There are no streets between the buildings, all walks are covered and the courts between the buildings are landscaped.

The Center's hard core is the J. L. Hudson Company four level department store. This project launched by Hudson is the largest regional shopping center in the United States. Hudson's is reported to be the leader in dollar sales in the department store field of single companies, not including subsidiaries. At the Northland Center, Hudson occupies a floor area in excess of 472,000 square feet.

The tenants occupy the five buildings around the Hudson Northland. These buildings are all single story and total over 525,000 square feet. The Center, in addition to its private dining rooms and cafeterias, provides other community service such as a 300 person capacity community-auditorium.

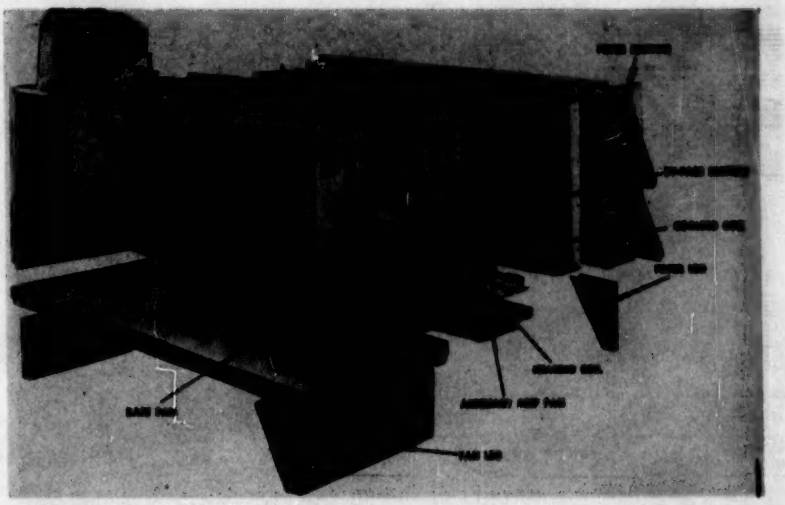
Chilled Water System

Chilled water circulating system at Northland involves a 2200 foot run of two 30-inch diameter cast-iron mains between the chillers located in the machinery building and the first distribution point in the Center. These huge mains, although cast-iron, are made up with mechanical joints and are buried uninsulated in the ground. According to the design engineers, the water supply averages a 3 degree F drop in temperature between the two points. The return main averages 55 F, which is the average ground temperature for this section of the country. The highest elevation from the buried mains to any point of use in the system is 95 feet.

Union centrifugal pumps are used to circulate 6,000 gpm against an 80 pound design discharge head. For flexibility of service, the plant is provided with three pumps, one of 3000 gpm capacity and two 1500 gpm. Four-inch mains carry the flow from the pumps to the restaurant, and these mains are also buried uninsulated in the ground.

Pressure in Mains

According to the chief engineer, a pressure of 40 psig is maintained on the mains constantly and he, therefore, anticipates no trouble due to any oxygen or air being entrained in the system. To date, he has had to use no chemical treatment but plans on following a recommended sodium sulphite corrosion prevention treatment. The system at present has a determined capacity of 53,000 gallons.



Exploded view of the built-up sections typical of the Weather-maker units installed at Northland Center.

Combination Instrument Meters Chilled Water Service

Chilled water supplied to the tenants from this system is measured by relatively new type meters which are a combination of Bristol thermopotentiometers for recording at temperature differential between the chilled water supply and return, and a Hagan ring balance meter for measuring the volume of the water supplied. The unit of measurement employed is the *therm*. One *therm* is equivalent to 100,000 British Thermal Units (which requires about a minute and 24 seconds work for the cooling plant).

Fifty-five meters of this type are employed in the Center. One is used as a master to reconcile the total compiled from the 54 meters used to measure tenants consumption. With some 80 tenants, it is necessary that some meters be used for several customers. Their bills are pro-rated according to their space requirements. When it is considered that the cost of these meters is in the vicinity of $4,000, the economy of using one meter for several tenants is immediately realized. Total readings of the meters are further reconciled by the engineering department through the use of watt-hour meters used in connection with the refrigeration equipment and auxiliaries.

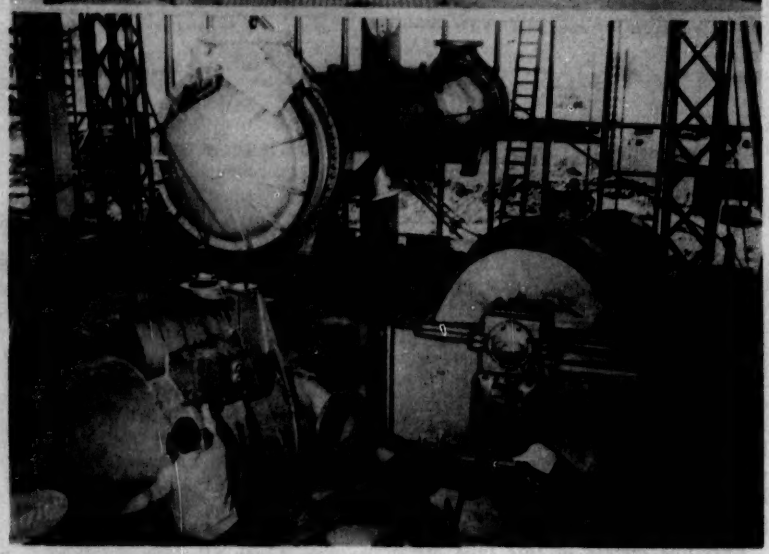
Use of this central chilled water distribution system over individual tenant-owned or operated air conditioning units was decided upon by the owners and the design engineers for the very utility of the system. The central station chilled water system selected lends itself architecturally, is more easily maintained, and original costs are lower than totals for individual equipment in each store, meter and metering costs notwithstanding. It was reported that the system selection was also based on a 40-year amortization plan.

High Velocity Air System

Two types of air distribution systems are employed in the Northland Center. At the Hudson store, building A, a high velocity system is used. High velocity, in this case refers to the transportation rate of the air, which moves at 4800 fpm in the ducts. Fan discharge is 5-inch SP, as compared with the conventional 1-½ or even 2-inch SP.

Although the main ducts in this system are 60 by 30 inch, the principal advantage of the high velocity system is that it reduces the size of the ducts required to carry large capacities. The Hudson store system delivers 450,000 cfm from nine built-up units consisting of Carrier fans, heat exchangers, filters and driers. Taken as a unit, they are known as Weathermakers. All nine units are located in the 120 by 210-foot penthouse over the Hudson store. Air is discharged at 1-inch SP through sound absorption boxes and pressure reducing grillles. These grilles are of tile size, perforated and appear as part of the ceiling acoustical treatment.

Air distribution for tenants in the Center other than Hudson, is by means of low velocity systems. Again Carrier Weathermakers, concealed, provide conditioned ventilation. Larger tenants have individual units in much the same way as they are individually metered for their chilled



Above: One 1800-ton chiller pictured as it was delivered to the Northland Center. Note the heavy timber rig required to distribute the weight evenly over plant floor and the precautions taken by manufacturer to prevent contamination of chiller interior.

Below: View of the same chiller about to be skidded between the two compressor units and beneath the condenser, all of which have been previously spotted. Note cage mast rigging which supports the condenser.

water. Smaller tenants are handled through application of zone controls, one Weathermaker unit providing conditioned air for several shops.

In all, the duct work involved for air distribution totals approximately five miles of Carrier factory fabricated conduit averaging 20-inches OD in a building. This conduit was supplied in 20-foot lengths and insulated with 1-inch polyethelene coated fibrous mineral insulation material. The insulation was provided to meet a dew point situation which the design engineers anticipated in connection with long shut-down periods. Its purpose is to prevent condensation drip on furred side of paneled ceilings. (Roof insulation, although applied to the Center buildings, was not considered in calculating building loads according to design engineers.) Lighting and personnel loads were the heaviest factors considered.

Refrigerating Plant

The present refrigerating plant involves two 1800-ton Carrier units. Each unit consists of two centrifugal compressors of 900-ton capacity each driven by a Westinghouse 4800 volt synchronous unity power factor, constant speed motor. Both compressors discharge into a double condenser at 103 F maximum, with a design condenser water temperature range of 85 to 95 F.

A single chiller, located below the condenser and between the two compressing units chills 3,000 gpm water from 55 F to 40 F at design operating conditions, giving a total maximum capacity of 6,000 gpm. The refrigerant is Carrene-2. The two units contain some 12,000 pounds of refrigerant, representing an investment of over $5,000 in refrigerant alone.

Operation of the main chillers and other auxiliaries is accomplished from a central point. Loading of the machines is handled from this same vantage point, the main control board. Each machine is capable of regulation from its minimum to 900-ton maximum capacity through suction dampers. Dampers are controlled by Taylor Precisor Air-Motors actuated by a T-bleed valve and air gauge on the main board. Purgers are located on each side of the main control board and operate continuously with the units. Lines from the purgers to the condensing units are concealed beneath the floor.

Condensing Water Pumps

There are three condensing water pumps; one 6,000 gpm and two 3,000 gpm, operating against the design head of 27-foot. These are Union pumps and the cooling tower is by Marley Company. The tower is rated at 8,000 tons, providing for the additional 3600 tons of refrigeration to be added to the plant for its additional stages of construction. The cooling tower and its foundation is on grade at the rear of the machinery building. The engineer for the Center pointed out a well constructed heavily galvanized finish fence erected at the cost of nearly $4,000. At the time of the tower installation, its attractive nuisance potential with children was overlooked. The chief engineer has fenced them out with the thought of preventing serious consequences that may occur from later chemical treatment or a drowning in the case of a smaller child.

Make-up for the tower is from city water mains. Hagen phosphate treatment is the only chemical employed at present in minimum quantities to prevent delignification. It is planned to combat algae by dosages of 19 percent hyperchlorite and sodium bi-chromate. Concentration of solids is maintained at 2.9 percent by constant blow down.

Protection Devices Added

At present the Center is not provided with an auxiliary power source, deriving all its power from its own sub-station, serviced by the local public utility. The chief engineer told about an operating incident concerned with power failure to his auxiliaries. When the plant was first placed in operation, a 440-volt source of supply for the auxiliaries failed through a transformer derangement. The four main units, on a 4800-volt bus continued to operate.

These units are equipped with normal safety devices provided by the manufacturer; namely, a refrigerant low-temperature cut-out, a chilled water low-temperature cut-out, and a high head pressure cut-out. However, after that power failure, and although no damage was done, the chief engineer had added another very economical safety system. Electrical inter-locks between the 1,000 hp motor controls supplied by the 4800-volt bus, have been tied in to the controls for all 440-volt auxiliaries. Failure of all auxiliary units on condensing water service, or failure of all pumping units on the chilled water circulating system, immediately shuts down all 1,000 hp motor units driving the compressors.

Engineering Personnel

Chief engineer of Northland Center is Charles Rouse. Mr. Rouse is assisted by five engineers and four operators. His maintenance personnel consists of a foreman and eight craftsmen, involving electricians, plumbers, steam fitters and temperature men. His department is not only charged with the responsibility of operating the steam and refrigerated water supply systems, but also with the maintenance of all units attached to both systems, and the electrical distribution system throughout the Center. A portion of maintenance involves changing 600 throw-away filters every 30 days.

Designers and builders involved in the construction of the center were Victor Gruen Associates, architects, H. E. Beyster & Associates, Inc., associate engineers, Bryant & Detwiler, general contractors, and Carrier Corporation as a vendor of the air conditioning and refrigeration equipment.

Side attractions to the Northland refrigeration story involve auxiliary air conditioning and refrigeration for cafeterias and restaurant, and miscellaneous shop refrigeration. In the J. L. Hudson 4th level cafeteria and personnel offices, Carrier conduit Weathermaster systems are used at exposed wall areas beneath windows. This serves as an auxiliary air-conditioning system to Hudson's high velocity system described. Frigidaire units are installed and maintained by cafeterias. The grocery, bakery, and miscellaneous food shop refrigeration units are employed in the various the tenants.

In early 1935 Chief Engineer Charles Rouse became mechanical superintendent for the Northland Center, moving from that position to chief engineer when the plant was placed in operation. Prior to that Mr. Rouse had been chief engineer for Ira Wilson & Sons Dairy in Detroit and for five years in the same capacity with United Dairies, Inc. Prior to his dairy operating experience, the chief had been supervising engineer for RKO Theatrical Division during seven years of construction projects. Prior to that, he had served nearly a dozen years at the Detroit Edison Company in power plant construction and maintenance departments. Mr. Rouse holds many licenses by virtue of his operating experiences and is a member of the Industrial Electrical Engineers Society at Detroit.

Air Conditioned Streets At Canadian Center

ONLY a few modern-type regional shopping centers in the U.S. are larger than the Greater Hamilton Shopping Center. But none of them are of the type which permits year-round shopping under ideal conditions.

The Hamilton Center will be the first to put into practice the relatively new idea of covered, air-conditioned shopping avenues, or indoor streets. These shopping avenues and the Center's huge size are the basis of a claim to uniqueness.

More than two fifths of a mile of smaller stores will be double-fronted: they will face both onto the parking area and onto the covered avenues. The fronts on the inner avenues will have no glass. To lock up at night, merchants will use grilles.

These avenues will be one on top of another. Parking on one side of the center will be at level with the second story, on the other parking at the first floor level. Escalators will spare customers trouble in moving from one level to another.

Cost of the Center is put at $18,000,000 and it will cover 70 acres. The first two stages are expected to open for business this fall. They are the two-story 200,000 sq. ft. Simpsons-Sears department store and a 32,000 sq. ft. Dominion food market. The Center is now leasing merchandising space in a huge main shopping goods building, which is to contain another department store, 70 or so smaller stores and two covered air-conditioned shopping avenues.

Bermuda Onion Storage

A LATE report on the storage of Bermuda onions by U. S. Cold Storage Corp. and Alford's Refrigerated Warehouses in Dallas in controlled experiments and results have shown that Texas Bermuda onions can be stored satisfactorily at 32 to 35 F. provided there is no deviation above or below this range. Humidity of 50 percent provides good storage but more shrinkage, and 75 percent appears to permit more decay, and so about 60 to 65 percent seems advisable. Onions placed in cold storage as soon as possible after harvest showed less early sprouting when removed than those held in common storage before cold storage.

In current studies, the effects of pre-storage treatment are being investigated further. Various storage periods are being considered. These studies will serve as a check on earlier investigations. TRRF Information Bulletin.

Refrigerated Warehouses Receive Safety Awards

THE Cumberland Warehouse Corporation, Bridgeton, New Jersey and the United States Security Warehouse, Columbus, Georgia have been presented with Safety Certificates for outstanding plant safety records by the National Association of Refrigerated Warehouses. The plants qualified for the award by going one year without a lost-time industrial accident.

New Canadian Plant To Manufacture Freon

A PLANT for the manufacture of "Freon" will be erected at Maitland, Ont., by DuPont Company of Canada Limited, it has been announced. The plant will be of sufficient capacity to fill all Canadian requirements for these chemicals, now largely imported from the United States, and will use Canadian base materials wherever possible, the announcement stated.

Commercial Storage of Fruits and Vegetables Florist and Nursery Stock

A BULLETIN of considerable interest to refrigerated warehousemen has been issued by The U.S. Department of Agriculture on "The Commercial Storage of Fruits, Vegetables, and Florist and Nusery tocks Stocks," as Agriculture Hand Book No. 66. The authors are R. C. Wright, senior physiologist, Dean H. Rose, formerly senior physiologist, and T. M. Whiteman, associate horticulturist, Biological Sciences Branch, Agricultural Marketing Service.

The purpose of the publication is to present a series of brief summaries of the essential average storage requirements of most of the important fresh fruits, vegetables, and cut flowers, and certain other horticultural crops that enter the market on a commercial scale.

Temperature of Storage Rooms

If the best results are to be obtained in the cold storage of products it is highly important that the temperature in storage rooms be held fairly constant. Variation of 2 or 3 F above or below the desired temperature are too large in most cases. Variations can usually be prevented if the storage rooms are well insulated throughout and have adequate refrigeration, and if the spread between the temperature of the refrigerant and that of the room to be refrigerated is kept small. For example, in a room where 45 degree is the desired temperature using ammonia evaporating at about 26 degree in the coils, fluctuations of plus or minus 1½ F may occur in the air temperature in the room; whereas at 32 F. with ammonia also at 26 F, fluctuations in the room temperature are usually less than plus or minus 1½ F.

However, the spread between the temperature of the refrigerant and that of the room is more important in maintaining humidity than in preventing fluctuations in the room temperature. Storage rooms should be equipped either with reliable, accurate thermostats or with manual controls which are given frequent personal attention by someone charged with that duty. Even when reliable automatic controls are used, they should be checked periodically.

Control of temperature is usually easier in large rooms than in small ones if both are filled to capacity. This is because of the "flywheel" effect produced by the larger mass of material, including both the commodity and the building material. Refrigeration is thus stored up, so to speak, and the temperature changes occur more slowly. For this reason small storage rooms usually require closer attention than large ones.

Humidity of Storage Rooms

The relative humidity of the air in storage rooms has a direct relation to the keeping quality of the products held in them. If it is too low, wilting is likely to occur in most fruits, vegetables, cut flowers, and similar products; if it is too high, it favors the development of decay, especially, in rooms where there is considerable variation in temperature. The exact control of humidity is rather difficult, and in the past it was not often attempted in commercial storage warehouses.

However, as new plants are designed and old ones remodeled, more accurate control is being developed. Of first importance in maintaing adequate relative humidity in the storage-room air, is the providing of sufficient coil area so that the spread between the temperature of the coil and the desired commodity temperature is as small as possible.

Reducing Humidity

Conversely, when a low relative humidity is desired, the coil area should be restricted and the temperature lowered so that the moisture in the air will be condensed. Valves can be installed to control the evaporating pressure of the refrigerant; these are essential to good temperature and humidity control. A quick, temporary method of lowering the humidity is to introduce heat into the room by a blower or strip heater; this added heat will necessitate more refrigeration that will condense more moisture from the air. To build up the humidity, various commercial devices are used in which water vapor is introduced in the form of steam or as an atomized water spray. A humidistat is useful in automatically regulating the relative humidity.

For most fruits that are stored commercially, a relative humidity of 85 to 90 percent give the best results. For leafy vegetables and root crops, the relative humidity should be about 90 to 95 percent; for other vegetables, except as noted, 85 to 90 percent. If it is necessary to increase the relative humidity in rooms used for common, or air-cooled storage this can be done by sprinkling the floor occasionally.

Cold and Freezing Injury

Certain fruits and vegetables are susceptible to cold injury by temperatures that are not low enough to cause them to freeze. Experimental observations and experience of commercial operators have shown a wide variation among commodities in their susceptibility to freezing injury. Some may be frozen and thawed a number of times without permanent injury, whereas others are permanently injured by even slight freezing. The freezing point of the commodity is no indication of the damage to be expected by freezing or chilling. For example, tomatoes and parsnips both have a freezing point of 30 F., but parsnips can be frozen and thawed several times without apparent injury, whereas tomatoes are ruined after one freezing. Again, mature-green tomatoes will be injured so that they will not ripen properly if held at 32 to 40 F for longer than 3 to 5 days, whereas parsnips may be held at 30 F for many weeks without deterioration provided they are not permitted to dry out.

Storage of Cut Flowers

Regarding the storage of cut flowers it is important to know what varieties and species can be expected to keep well under given storage conditions. The best flowers for storage are normally those that have developed under optimum growing conditions and that have received no mechanical or other injury before being cut. Flowers of high quality are said to be "firm" and to have "substance" terms which probably could be justified on the basis of higher total solid matter, as contrasted with "soft" blooms that usually develop under conditions of forced growth.

Well-grown flowers do not have hard, or excessively woody, stems for the species; hard stems make water uptake difficult. In selecting cut flowers for storage, the proper maturity discussed under individual species is of prime importance.

Sub-Zero Treatment of Metals

H. T. GREGG, JR.
Supt. Metallurgical Unit
Construction Materials Laboratory
General Electric Company

Low-temperature test equipment enables operator to control the behavior of metals in such processes as sub-zero assembling, control of age-hardening, cooling during machining, and stabilization of precision parts.

IN THE early stages of metallurgy, when the village blacksmith was the only practicing metallurgist, heat and forge hammer were the only tools used to make metals conform to man's wishes. But today many methods transform metals into the implements of modern living. One of the more unusual and recent developments in methods for controlling the behavior of metals is the use of sub-zero assembling, control of age-hardening, cooling during machining, stabilization of precision parts, and supplementary treatment in hardening steel.

The first accounts of work done on the low-temperature treatment of metals dates back to the latter part of the 19th century. More recently changes such as increases in hardness, volume, and magnetic intensity plus greater stability were observed—caused by a more complete transformation of austenite to martensite. Austenite is steel's high-temperature phase that appears above 1340 F; it is relatively soft, non-magnetic and dense. Martensite, produced upon quenching austenite to room temperature, is very hard and magnetic, and has a density less than that of austenite.

This transformation from austenite to martensite enables steel to be hardened. But it's practically impossible to transform 100 percent of the austenite to martensite on quenching. Sub-zero treatment can transform the remaining austenite.

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Except for some stabilizing, shrink-fit assembling, and control of aluminum age-hardening, only in the last 15 or 20 years has practical use been made of sub-zero treatments.

Sub-zero Assembling Processes

Shrink-fit assembling involves heating the outside fitting and allowing it to shrink around the center plug, stud, or bushing—a procedure often impractical or even impossible because of damage caused by the necessary high temperature. This is true of certain steels and most aluminum alloys. However, if the internal part is sub-cooled, heating of the external part is either eliminated or reduced to a temperature that will not damage the part.

This method of expansion-fit can frequently be used to replace hydraulic press equipment where a press-fit assembly is being made. Simply by cooling the internal part, an assembly that previously required tons of pressure can now be made by hand. Expansion-fitting also has distinct advantages over pressfitting. It can increase production and lower manufacturing costs, prevent unnecessary strains from being set up, and avoids scoring of the mating surfaces.

Sub-Zero Assembling Operations

Here are a few of the many sub-zero assembling applications:

Assembling cast-alloy valve seat rings in automobile cylinder blocks.

Placing an alloy-steel ring around coining or cold forging dies to prevent splitting.

Assembling case-hardened ring gears without tempering the case.

Inserting steel ball-bearing races in a cast-iron housing.

Assembling thousands of bearings and bushings of all sizes and shapes.

Low temperatures are also useful in removing certain assembled parts.

With large bushings, for example, it's possible to insert a tight-fitting cup-type container filled with a sub-zero-cooled convection fluid. Under favorable circumstances, including low enough temperatures, bushings and similar parts can be removed in this manner.

Control of Age-Hardening

The best-known and probably the most important application of low temperatures is in the delay of age-hardening aluminum rivets. Heat-treated rivets of the 17S-or 24S-type aluminum alloys begin to age-harden almost immediately after quenching. To keep the rivets in a soft and satisfactory condition for driving, the age-hardening action must be retarded by suitable cold storage. By storing these rivets at 32 F immediately after quenching, age-hardening can be delayed for about two days; but by using sub-zero temperatures of minus 40 to minus 50 F, this hardening action can be suspended for several weeks.

Low-temperature retarding of age-hardening is also suitable for punched and formed parts of aluminum alloys. Parts made from these materials can be heat-treated after the blanking operation and stored at sub-zero temperatures until ready for

forming. This procedure is especially applicable to sections and intricate parts that can become distorted if heat-treated after forming.

Cooling in the Machining Process

Because the efficiency of a machine tool can be measured by its ability to resist wear, tool wear must be small in comparison to wear resistance. This efficiency can be increased in many ways, but few are of any significance. A coolant can reduce these temperatures considerably but frequently will become heated itself to 150 to 160 F, thereby losing its value to a great extent and requiring cooling. This is accomplished by passing the coolant through a refrigerated coil. When extreme accuracy is needed, it is sufficient to keep the coolant at a constant temperature of about 70 F. Longer tool life can be attained by using a coolant at sub-zero temperatures.

We recently investigated the use of low temperatures for cooling cutting tools during operation. The results were excellent. In one test, tool life of small Carboloy (Reg. trade-mark of General Electric Company) milling cutters was increased more than 400 percent by applying a sub-zero-cooled compressed air stream on the cutter edge during the milling operation. This procedure not only increased the cutter life but also made a smoother finish possible.

Stabilization of Precision Parts

Before sub-zero temperatures were readily available, machine-tool castings were often stabilized by subjecting them to outdoor weather conditions for several seasons. Exposure to zero or sub-zero temperatures, plus summer temperatures, was sometimes sufficient to produce the required degree of dimensional stability. With the means for readily producing sub-zero temperatures today, much greater stability can be achieved in a matter of a few hours.

Prior to the use of cold treatments, the Bureau of Standards required six years of natural aging before certain precision gages could be certified as stable. This requirement has long since been changed because of employment of sub-zero temperatures in the stabilizing process.

It has been well established that the progressive dimensional changes in hardened steel result from a gradual transformation of retained austenite to martensite. This slow transformation causes a volume increase in the steel and continues to do so until all of the austenite has been changed. Of course, a series of long tempers at elevated temperatures will transform a large percentage of this austenite but at the same time will lower the hardness of the steel. In applications such as precision gages, high hardness, as well as dimensional stability, is required, thus making imperative the use of sub-zero temperatures for stabilization.

Previous articles published in INDUSTRIAL REFRIGERATION on the sub-zero treatment of metals.

Mobile Sub-Zero Holding Rooms in Aircraft Plants. October, 1953, page 56

Machine Shop Uses Dry Ice to Shrink Parts. May, 1954, page 52

Low Temperature Chambers For Cold Treating Metals. June, 1954, page 8

New Aluminum Alloys Provide Tensile Strength for U.S. Stratojet Bombers. August, 1954, page 42.

A 1944 Massachusetts Institute of Technology research report states that virtually complete transformation of retained austenite can be accomplished by cooling to minus 250 F, provided the sub-zero treatment is applied immediately after quenching. However, for most applications—including all types of gages and precision gage blocks—a series of sub-zero treatments of about minus 150 F is adequate to give satisfactory stability.

Supplementary Treatment

One of the more recent low-temperature applications is the use of sub-zero temperature treatments as a supplement to standard heat-treating procedures. All steels retain a certain amount of untransformed austenite after cooling or quenching to room temperature, the higher alloyed steels being the worst offenders. With proper heat-treatment the percentage of austenite can be held at a minimum but never completely transformed to martensite. If the quench from the hardening temperature is not stopped at room temperature but is continued down to sub-zero temperatures, progressively more austenite breaks down into martensite as cooling continues down to approximately minus 120 F. At this temperature the amount of austenite remaining untransformed is negligible, and temperatures as low as minus 317 F (liquid air) have no further effect.

The results of this conversion of austenite into martensite are increases of both volume and hardness. This means that a tool or die that has been improperly heat-treated and has shrunk when quenched can often be salvaged by sub-zero treatment. It will also increase the hardness and thus the wear resistance.

The so-called air-hardening steels have a high hardenability and often exhibit a tendency to remain in the austenitic condition after hardening. Thus these steels respond effectively to sub-zero treatment. For example, the hardness of a small sample of air-hardening steel of the 1 percent carbon, 5 percent chromium variety was increased 18 points on the Rockwell C scale by cooling it to minus 150 F for 3 minutes after it has been overheated in hardening. Of course, this does not usually occur in practice, but it does show the rapid response of this steel to sub-zero temperatures.

Except for carburized steels, the oil and water hardening varities are little affected by low-temperature treatments.

Ball Bearings

Ball-bearing steels, such as the SAE-52100 type, exhibit a tendency to remain austenitic. This results in low hardness and dimensional stability, two conditions that cannot be tolerated in this application. However, a sub-zero treatment of minus 150 F after the first temper usually increases the hardness of this steel several points. In the bearing industry this treatment is used rather extensively today to meet the exacting hardness and dimensional requirements.

It might seem at first glance the sub-zero temperature treatments can be used as a cure-all in the toolroom. This is far from correct, however. For in the final analysis the most important use of low temperatures as a supplement to heat-treatment at present is in salvaging high-alloy steel tools and dies that have received an improper heat-treatment.

The use of sub-zero temperatures in the processing and control of metals, in spite of its many uses, in large measure still remains "an unknown quantity." Of course there is little or no question concerning the merits of the use of low temperatures in assembling processes, control of age-hardening, or even in the machining process. The application of sub-zero temperatures to the heat-

(Continued on page 46)

Research and Development Facilities Announces Combined Personnel

THE research and development facilities of the Army Quartermaster Corps have been combined recently at a new Quartermaster Research and Development Center in Natick, Massachusetts. This activity is responsible for conducting the research and development required for the design and manufacture of equipment for the Army Field Forces. Personnel shown in the photograph below comprise the Refrigeration Equipment Branch of the Mechanical Engineering Division.

Engineering personnel of the Refrigeration Branch, Mechanical Engineering Division, Quartermaster Research and Development Command, at Natick, Massachusetts. Seated, left to right are: R. J. Campbell, Dr. D. L. Fiske, W. C. Whittlesey, Chief of the Refrigeration Branch, H. S. Jones, and P. Sayre. Standing are: F. W. Lewis, J. V. Davidson, M/Sgt. Wylie, and A. N. Johannesen.

These engineers have laboratory, shop and testing facilities at their disposal for conducting basic research and implementing the development of equipment broadly related to the refrigeration problems of the Armed Services, and are responsible for the design of items required for the preservation of perishable foods at all operating levels world-wide.

Junius W. Millard, registered engineer, is the research director of the Mechanical Engineering Division. Mr. Millard was graduated from the Naval Academy in 1922. He received his Master's Degree from the University of Kentucky in 1925 and is a member of ASRE, ASHVE and ASNE. Mr. Millard held the rang of Captain in the Navy during World War II and now hold a commission in the USNR at that rank. Prior to World War II he was associated with the Carrier Corporation.

Welsh C. Whittlesey, registered engineer, is chief of the refrigeration branch. A graduate of the University of Washington, 1929, Mr. Whittlesey is a member of ASRE and ASHVE, and has been associated with the design and installation of refrigeration and air conditioning equipment with the Navy, Air Force and commercial contracting and engineering concerns. He joined the Quartermaster Research & Development organization recently from the Headquarters, Command of the Air Force.

Harold S. Jones, registered engineer, assistant chief of the refrigeration branch, graduated from Carnegie Institute of Technology in 1941 and is an ASRE and ASHVE member. He holds a reserve commission in the Air Force. Other connections have included development engineering with Clayton and Lambert Manufacturing Company; the Sullivan Division, Joy Manufacturing Company; and the Aero-Medical Laboratory, Wright-Patterson Air Force Base. While associated with the Joy Manufacturing Company, Mr. Jones was engaged in a study of ultra-low temperature applications.

Allan N. Johannesen, a 1933 graduate of Purdue, was formerly chief of the Quartermaster Research & Development Laboratories at Jeffersonville, Indiana. He is responsible for the refrigeration testing program at Natick. He served as a Colonel in the Quartermaster Corps during World War II and has had wide military experience.

David L. Fiske, registered engineer, received his Bachelor's Degree from Massachusetts Institute of Technology in 1920 and his Doctorate from Columbia University in 1943. He is a former consulting engineer, a past editor of the Refrigerating Data Book, and is a life member and former secretary of ASRE.

Richard J. Campbell, registered engineer, graduated from Kansas State in 1931. He was formerly associated with the Frick Company. A member of ASRE, Mr. Campbell, has had considerable military experience and holds a reserve commission as a Lt. Colonel.

J. V. Davidson, registered engineer, is responsible for research and development on commercial refrigeration items. Mr. Davidson is a 1910 graduate of Rose Polytechnic Institute, and has had 30 years' experience as representative for the York Corporation and other refrigeration companies. He is an NAPRE member.

Frank W. Lewis, an ASRE member, is from the University of Kentucky. He was formerly associated with the Carrier Corporation. He has been with the Quartermaster Corps since 1948 and has participated in two tours of duty as an overseas observer.

Master Sergeant John P. Wylie is a Quartermaster Corps equipment repair supervisor. He has had extensive field experience with refrigeration equipment and recently returned from overseas service at Okinawa.

Philip Sayre, formerly a naval architect and mechanical engineer at the Boston Naval Shipyard, is a designer of portable field refrigeration equipment.

Frozen Food Association Given Award of Merit

THE NATIONAL Association of Frozen Food Packers, with headquarters at Washington, D. C. has received an Award of Merit for its nutrition research program. These awards are conferred annually by the American Trade Association Executives for outstanding service by a national or regional association to the industry it represents and to the American public. The formal presentation of the 1954 award was made to NAFFP Secretary-Manager L. S. Martin at the recent annual convention of trade association executives held in Los Angeles.

The basis of the award is the long-range nutrition research program being conducted by the association in cooperation with companies in allied industries, leading university research centers and Federal Government agencies. The purpose of the NAFFP program is to establish information on the nutritional composition of all types of frozen fruits and vegetables.

Warehouse Industry Improves Safety Record

INCREASED, industry wide emphasis on safety is paying off for the public refrigerated warehouse industry. After one year of intensified safety campaigning, the Safety Committee of the National Association of Refrigerated Warehouses has tabulated the results in a report.

A. R. Carstensen, Sacramento, California, Committee chairman reports that the industry's frequency rate (number of accidents for every million man hours worked) dropped from 38.85 in 1952 to 36.94 in 1953. In addition, the industry's severity rate (number of lost days for every million man hours worked) dropped from 1.840 in 1952 to 1.378 in 1953.

Twenty-one plants experienced no lost time accidents during 1953, with one firm working 252,746 hours and another 109,256 hours without a lost time accident. In 1952 only thirteen firms achieved a record of no lost time accidents.

A national re-cap follows:

Hours worked	1953 11,125,955	1952 10,641,823
No. of injuries	411	413
Frequency	36.94	38.85
Days lost	14,613	14,879
Severity	1.378	1.840

In 1953, 21 plants worked 1,041,720 hours without a lost-time accident. In 1952, 13 plants worked 399,172 hours without a lost time accident.

A later report states that ice handling leads in both frequency and severity followed by cold storage. Ice delivery is in the third spot on frequency but is fourth in severity. Engine room comes in fourth in frequency and third in severity.

Types of Injuries

Foot injuries dropped from 33 percent in 1952 to 23 per cent in 1953. Safety shoe programs carried out by an increasing number of companies are believed responsible for this improvement. The committee reminds all companies that this is one place where they can help themselves in a hurry.

Back injuries again stand number two in percentage, and has jumped from 16 to 21 percent. It is suspected that too many companies have been negligent in utilizing the material supplied on back injury prevention. A proper-lifting campaign would reduce this percentage for 1954.

Concentration on these two types of injuries (feet and backs) would be covering 44 percent of all injuries for the industry.

In comparison with last year's report, more accidents were reported due to better participation by companies, but show a total drop in days lost. This was caused mainly because in 1952 there was an arm and leg lost totaling 9,000 hours while there was only one bad one in 1953, a death for 6,000 hours.

Training Conference Plans Broad Program

A REVIEW of technical progress and training will be presented to refrigerated warehouse personnel attending the training conference to be held at the Edgewater Beach Hotel, January 10-13, 1955. The conference is sponsored by The Refrigeration Research Foundation and the National Association of Refrigerated Warehouses. Enrollments are now being received.

The program to be offered is broad in scope, aimed at bringing together a representative group of top ranking leaders in refrigeration, with, particular reference to refrigerated warehousing.

Subjects to be discussed at the conference include the following: mechanical handling, single and multi-story; safety; warehouse sanitation; handling costs; receiving and delivery at dock; new storage products; employee relations; customer and public relations; selling warehouse services; storage of dairy products, fish, fruits and vegetables, meats, candies and nuts, poultry.

The Scientific Advisory Council of TRRF will meet in Chicago, January 13-15 right after the Training Conference. The USDA Cold Storage Research Advisory Committee has been invited to participate in the Council Meetings. The Foundation's newly formed Industry Advisory Council has been invited also. All refrigerated warehousemen are welcome. In line with its increased emphasis on improved packaging, TRRF is now vigorously developing an action program in the improvement of commodity packaging.

Montreal Warehouse Issues New Bonds

ADDITIONAL financing has been announced by Montreal Refrigerating and Storage Limited to carry out a capital expenditure program currently under way. Directors propose to issue first mortgage serial bonds, "in a principal amount to be determined, but which will not exceed $750,000 repayable over the next ten years."

Annual Meeting Scientific Advisory Council Jan. 13-15

THE ANNUAL meeting of the Scientific Advisory Council, The Refrigeration Research Foundation, will be held at the Edgewater Beach Hotel, Chicago: January 13 to 15. Based on experience with the 1954 meeting, these meetings will be conducted with a somewhat different and enlarged format in order to widen their useful effect and give them greater practical value.

The first day of the Council sessions, Thursday, January 13, will be devoted to informal special task group discussions, held in separate meeting rooms and dealing individually with nine specific major commodity problem areas and research or industrial activity areas. These task groups will each be guided by a selected specialist in the particular field. As a result of these discussions, each task group leader will then report to the more formal Council sessions on Friday, January 14, the conclusions and recommendations for foundation action in the respective activity areas under consideration. The Council sessions will adjourn about noon, January 15.

There will be nine informal task group discussions on Thursday, January 13, as follows:

10-12 AM: Engineering problems, Dairy Products, Fisheries Products.

2-4 PM: Functional Packages in Warehouses, Meats, Bakery Products

7-9 PM: Frost Heaving, Poultry Products, Fruits, Vegetables & Nuts

Each task group will be made up of council members, project leaders and invited research or industrial leaders, who are especially concerned with the specific major commodity problem or engineering phases.

It is believed that this plan of informal discussion sessions on the initial day of the Council Meetings will allow a more detailed and thorough study of the respective major areas of interest and yet will result in more concise presentation of conclusions and recommendations to the council as a whole.

These informal group discussion sessions and the more formal Council meetings are open to all warehousemen, whether Foundation members or not, especially to members of the Foundation's newly formed Industry Advisory Council. The meetings are also open to members of the USDA Research Advisory Committee, who are especially invited to participate in the Council Meetings.

American Society Refrigerating Engineers Installs Officers

Leon Buehler Jr.
Chicago, Ill.
President ASRE

Carlyle H. Ashley
Syracuse, N.Y.
Vice-President

H. F. Spaehrer
St. Louis, Mo.
Vice-President

Cecil Boling
W. Hartford, Conn.
Treasurer

R. C. Cross
New York, N.Y.
Executive Secretary

Robert C. Blatt
New York, N.Y.
Dir. Publications

THE American Society of Refrigerating Engineers installed the following national officers and directors for 1955 at the Society's 50th annual meeting held in Philadelphia November 28 — December 1, 1954.

Officers and Directors

President: Leon Buehler, Jr., chief refrigeration engineer, Creamery Package Manufacturing Co., Chicago, Ill.

First Vice-President: Carlyle M. Ashley, chief development engineer, Carrier Corporation, Syracuse, N. Y.

Second Vice-President: Hermann F. Spoehrer, vice-president and treasurer, Sporlan Valve Company, St. Louis, Mo.

Treasurer: Cecil Boling, president, Bush Manufacturing Company, West Hartford, Conn.

Directors (Three Years): Daniel D. Wile, vice-president and chief engineer, Refrigeration Engineering, Inc., Los Angeles, Calif.; Gayle B. Priester, air conditioning engineer, Consolidated Gas Electric Light & Power Co., Baltimore, Md.; Harold M. Hendrickson, association professor, Dept. of Mechanical Engineering, University of Washington, Seattle, Wash.; Justin Neuhoff, manager-Engineering, Commercial and Industrial Air Conditioning Dept., General Electric Company Bloomfield, N. J.; (Two Years) Joseph R. Chamberlain, chief engineer, Industrial Products, York Corporation, York, Pa.

Installation

The installation ceremonies were presided over by the retiring President, Arthur J. Hess, president, Hess, Greiner & Polland, Los Angeles, Cal., at the anniversary luncheon held in the Benjamin Franklin Hotel. The new officers will retain office for a period of 18 months, in order to coordinate their terms with those of the Society's 36 section officers.

The concluding feature of the Anniversary Luncheon was the presentation of a time capsule containing micro-films of the 36 section charters, and a letter from President A. J. Hess, extending congratulations to his successor, to be opened in December 2004, the 100th Anniversary of the Society. The Franklin Institute will be the custodian of the time capsule.

New Executive Secretary

R. C. Cross who joined the head quarters staff early in November as consultant was appointed Executive Secretary of ASRE by Council at its December 1 meeting. Mr. Cross succeeds M. C. Turpin who is retiring after eight years spent with ASRE guiding both the Society and its working staff through the postwar fluctuations of business life, and after some 35 additional years spent in the refrigeration industry. Mr. Turpin's future plans have not yet been announced.

New Publications Director

The appointment of Robert C. Blatt, as Director of Publications has been announced. Mr. Blatt was formerly with McGraw-Hill as Associate Editor of *Electric World*. Earlier he was Editor of *Airports and Air Carriers*, and Technical Editor of *Aviation*. He is a registered professional engineer in New York State and is a member of a number of Professional Societies.

The Officers

Leon Buehler, Jr., installed as president, is a holder of more than 25 patents on refrigeration equipment and processes, and has devoted his entire career to the refrigeration industry. Subjects which he has particularly concerned himself with, include ammonia and freon compressors, ice making equipment, fermentation, gas recovery, automatic refrigeration systems and bulk farm milk cooling tanks. He was formerly chairman of the Chicago Section and of the Program, Standards, General Technical, and Membership Committees. In 1949 he was promoted to the grade of fellow member in the ASRE. A native of New York City, he received his M.E. Degree from Cornell University in 1921.

Carlyle M. Ashley, installed as first vice-president, joined the Carrier Corporation upon graduation with a degree in mechanical engineering from Cornell University in 1924. Now chairman of the Technical Coodinating Committee, he had some years' experience as chairman of the Research Committee which is responsible for granting ASRE funds for research projects in refrigeration and air conditioning to educational institutions.

Hermann F. Spoehrer, installed as second vice-president, has held executive positions with valve companies since 1926. In 1949 he was elected president of the Refrigeration Equipment Manufacturers' Association. Past ASRE treasurer and chairman of the Finance Committee, he has served as director at large on council, as director and chairman of the St. Louis Section. To his credit also are chairmanships of the Membership Committee and of the Sections Committee. In 1949 he was chairman of the All-Industry Exposition held in Atlantic City, N. J. He was graduated from Washington University in 1924 and is a member of the Engineers Club of St. Louis.

Cecil Boling, installed as treasurer, has been in the heat transfer field for 21 years. In 1940 he formed the Cecil Boling Company, a sales and engineering organization. He was also founder of the Heat-X-Changer Company which is now a wholly owned Bush subsidiary.

Daniel D. Wile, installed as Director, has served as ASRE director,

(Continued on page 46)

Fact Finding Conference Plans Program

A TWO-HOUR production and procurement workshop on poultry and eggs will open the program scheduled for the 26th annual Fact Finding Conference, to be held by the Institute of American Poultry Industries in the Municipal Auditorium, Kansas City, Missouri, next February 11, 12 and 13, 1955.

The speakers handling the opening session Friday morning, February 11, will: (1) outline new production techniques to improve grades of market poultry; (2) analyze interior egg quality, improvement potential and limitations, the key to consumer acceptance; (3) present the production and marketing effects of the commercial caged layer movement.

The egg processing workshop on Friday afternoon will show how to reduce in-plant costs with low cost improvements, report on the views of users of egg products, describe the industry-wide savings available through a non-partial egg products laboratory, and will point to the new look for midwestern egg processors.

The Conference theme — "The Changing Picture in Costs — Sales — Profits" — will be brought even more into focus Saturday morning as speakers at the outlook worshop take a good look at poultry and egg financing, at the solutions to conditions that currently press the industry's future, and at the present trend toward emphasis on inspection and sanitation.

Saturday afternoon, at the Merchandising Workshop, speakers will: (1) report on consumer reactions to the factors associated with egg sales in super markets; (2) discuss the retailers view on what processors and marketmen must do to increase the sale of their product; (3) point up the hazards of negative advertising; (4) present a positive program for action in merchandising.

The final workshop of the Conference will be on poultry processing as speakers look to new developments in cooling and freezing poultry with emphasis on packaging needs, discuss precooked and frozen poultry, point up new techniques in bleeding and killing, and show how grade losses can be minimized.

The two-hour workshops are planned to give more time to floor discussion, says Dr. Cliff Carpenter, president of the Institute.

In the Auditorium's huge exhibit hall, the largest Conference exhibit ever held will be open all three days. More than 100 exhibitors will use over 35,000 square feet of space to display modern tools for more efficient operation and better products.

Conference-goers arriving in Kansas City on Thursday will have an opportunity to register early on the mezzanine floor of the Hotel Muehlebach. Registration at the Auditorium will open at 8:30 Friday morning, with exhibits opening at 9:00 A.M.

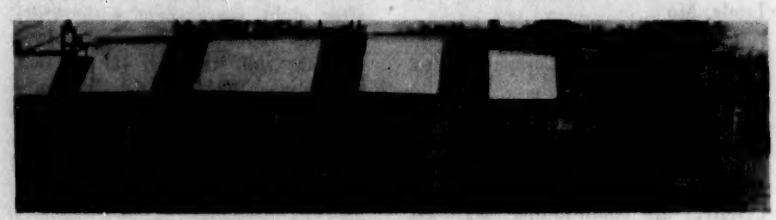
The second annual Junior Fact Finding Conference, for 4-Hand FFA members, will again be held. This project, initiated in 1954, is under the joint sponsorship of the Institute, the Extension Service and the National Committee on Boys and Girls Club Work, Inc.

At press time 21 states have already planned to send about 125 delegates and official chaperons to the event. The junior fact-finders will have their own schedule of program sessions as well as joining in several of the adult workshops.

Special events scheduled for the Conference will include an industry breakfast at 8:00 a.m. Saturday morning to be held by the Poultry & Egg National Board. On Sunday morning Institute members will hold their annual Breakfast Meeting at 8:30 a.m. The final event of the three-day meeting will be the Fact Finding Conference, Sunday evening supper, February 13.

Air-Cooled Condensers Cut Down on Costs of Maintaining Cooling Towers

UPKEEP of cooling towers and evaporative condensers required so many hours of work annually for maintenance crews of the Paxton Wholesale Grocery Co., Champaign, Ill., that Paxton now is equipping refrigeration at all of its new supermarkets with Kramer Trenton Unicon air-cooled condensers.



Fan side of five Unicons equipped with Winterstats for year round operation used on walk-in boxes and display cases — dairy, vegetables, meat and fish. In background at right is one of two RC 750 Unicons used on 10-ton system which air conditions the Paxton market.

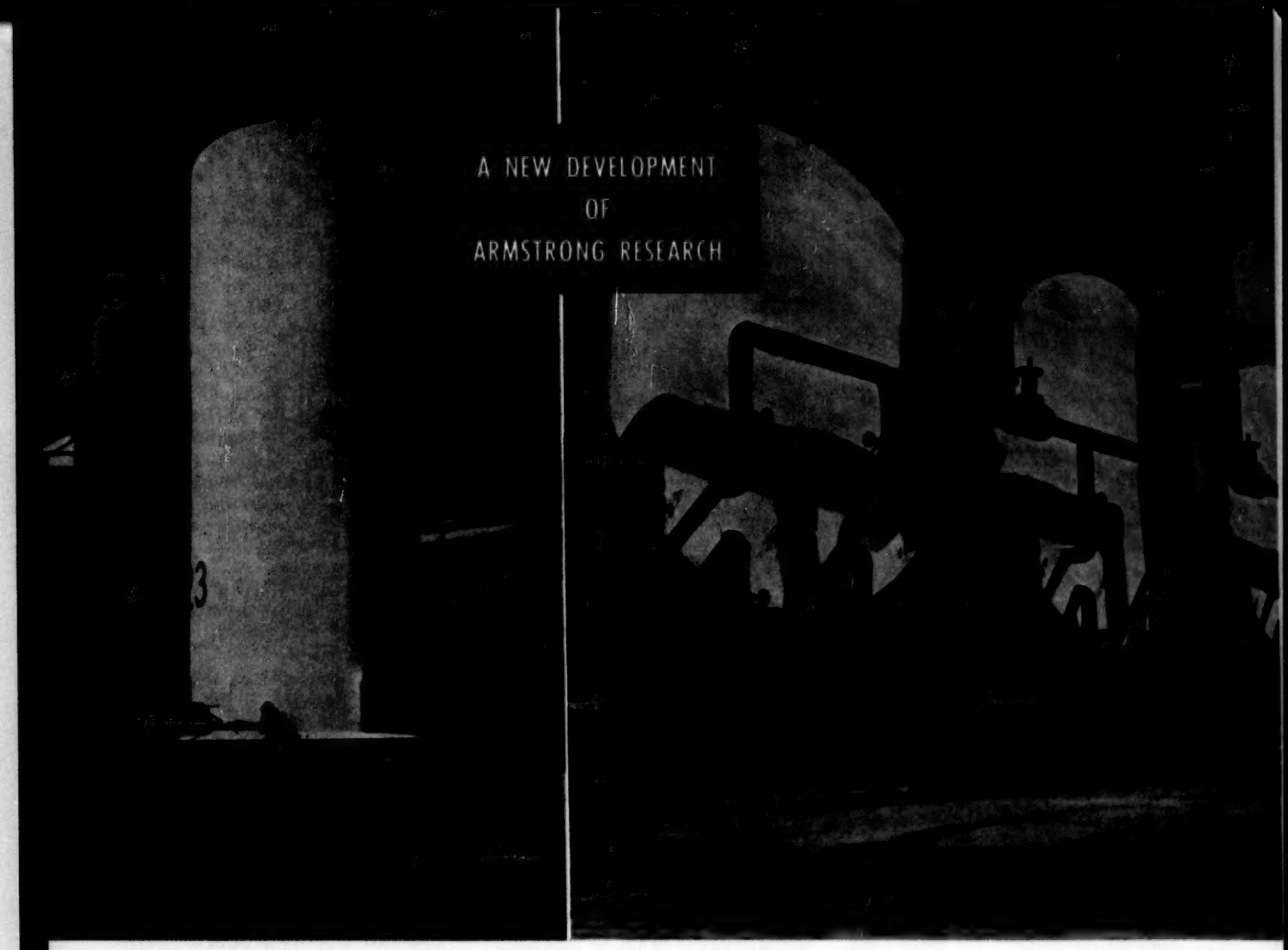
Elmer Colby, construction engineer for the Paxton chain of "Grab-It-Here" stores, reports that savings in water bills and maintenance work through use of Unicons have spurred the company to insist on nothing but air-cooled condensers. Unicons have been utilized by the Paxton Co. for two years.

At Paxton's "Grab-It-Here" market in Champaign, all condensing on the air conditioning system, open dairy cases, open vegetable cases, meat, fish and poultry cases and walk-in coolers is done by Unicon.

In all, the complete market installation requires the use of seven Unicons, two of which are used with two 5-ton Brunner air conditioning systems. The other five are equipped with Kramer Trenton winter controls. The condensers are mounted on the store roof and are equipped with standard motor hoods and floor stands. Condensers that operate during the winter months are equipped with the Kramer patented "Winterstat" winter control valve.

Winter controls are installed on one RC-300 Unicon operating with a 2 hp Brunner compressor on 22 feet of C. V. Hill double-deck dairy cases; one RC-200 operating with a 1-1/2 hp Brunner compressor connected to a 10-foot C. V. Hill open vegetable case; one RC-200 operating with a 1½ hp Brunner compressor connected to a 20-foot double duty C. V. Hill meat case; one RC-100 operating with a ¾ hp Brunner compressor connected to a 10-foot C. V. Hill fish and poultry case.

According to Colby, head pressures on the installation never went below 100 pounds during the past winter, although outside temperatures were as low as 15 F.



Insulcolor ... *a rugged plastic finish for insulation—indoors and outdoors*

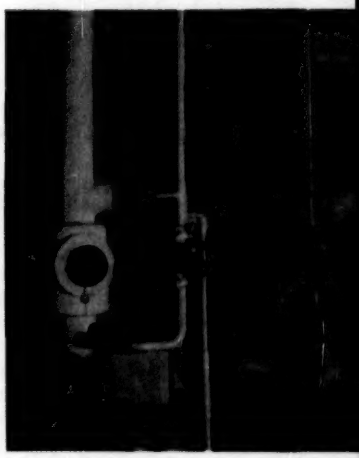
Now you can apply a protective finish to insulated tanks and lines that serves as color identification, too. New Armstrong Insulcolor provides a durable plastic finish in seven colors or white.

Under the most severe outdoor conditions, Insulcolor* will not crack, craze, or peel. The rugged plastic film withstands extremes of temperature and has excellent water-resisting properties. Bumping and abrasion won't damage Insulcolor's smooth, tough surface.

Used indoors, Armstrong Insulcolor is both finish and color key for all insulated steam, refrigerant, and cold water lines. It is also being widely used over cork insulation on equipment, air-conditioning ducts, and in cold rooms. Insulcolor is quickly and easily applied by brush or spray gun. It requires little or no maintenance.

Available through Armstrong's Contract Service, Insulcolor is one of the new products developed by Armstrong Research in the industrial insulation field. For full details on Insulcolor and Armstrong's Insulation Contract Service, call your nearest Armstrong office or write Armstrong Cork Company, 205 Stratton Street, Lancaster, Pennsylvania.

*Trade-mark



Both insulation finish and code color, Insulcolor eliminates stenciling or the extra expense of painting lines with identifying colors after the finish has been applied.

Armstrong INDUSTRIAL INSULATIONS

Florida Ice Men Hold Annual Convention

THE 29th Annual Convention of the Florida Ice Association held at Miami November 21 to 23 was acclaimed by all in attendance to be the best in the history of the organization from both an instructive and entertainment standpoint. Miami Ice Manufacturers were hosts.

Officers and newly elected members of the Executive Committee Florida Ice Association. Seated: Herman Osteen, Treasurer; J. S. Earman re-elected President; D. W. Browne, First Vice-President; L. E. Johnson, Second Vice-President. Standing: E. E. Milton, Don Kane, W. O. Shaddix, R. E. Cook, newly elected members of Executive Committee.

A spot-lighted crystal white ice-punch-bowl surrounded by orchids grown by the chairman of the entertainment committee, H. C. McConnell, "stole the show" in the first of a series of entertainment events. Plain and fancy drinks, punch and hors d'oeuvres were served at the get-acquainted party in the Santa Maria Room of the Columbus hotel on November 21. Two hundred guests attended the Monday evening party at the San Juan Restaurant where a banquet was served.

The Convention closed with a luncheon in the room with "the million dollar view" on top of the Columbus Hotel. Norman S. Bean, gave a talk on "Observations from Outer Space."

Dr. C. I. Cambert, Research Assistant of the University of Miami Marine Laboratory, gave an interesting talk on chemical ice, its potential use in the fishing industry.

Harry T. Hudson, Secretary of the Oklahoma Ice Association, in a talk on competitive conditions in the ice business, said that better conditions would result if they would all direct their main efforts toward creative instead of destructive planning.

Richard C. Muckerman, City Products Corp., St. Louis, Mo., gave his valuable experience on the installation and operation of ice vending machines.

A forum on truck icing was presented by R. E. Bradley, R. S. Wood, J. F. Causey, S. O. Sloan, and O. A. Nelms. They covered the subject of truck icing, hydro cooling of citrus, cutting costs of processing ice, automatic controls, ice vendors, shrimp and fish ice and ice carvings.

A. T. McIntosh, Director of the Safety Division of the Florida Industrial Commission reported on safety work in the Florida Ice Industry. He said the commission would continue monthly service if members would regularly report their accidents and man hours lost.

Guy W. Jacobs, executive secretary, of the National Association of Ice Industries, brought members of the Florida Association up to date on the work being done and the service provided by the National Association.

R. B. Roberts, Florida Power and Light Company, gave an optimistic address on the amazing growth of Florida and the probable future growth.

Officers and Directors

Officers and directors were elected as follows: President, J. S. Earman, Vero Beach; First Vice-President, D. W. Browne, Miami; Second Vice-president, L. E. Johnson, Marianna; Treasurer, Herman Osteen, Miami. Executive secretary, Muriel Washburn, Jacksonville. Board of Directors: R. E. Cook, Miami; E. E. Melton, Mulberry; W. O. Shaddix, Daytona Beach; A. Sterling Hall, Quincy, Don Kane, St. Augustine.

Illinois Association of Ice Industries

A REPRESENTATIVE attendance of top management was present at the annual meeting-fall conference of the Illinois Association of Ice Industries held at Springfield December 9. Under the topics covering experiences in the ice season of 1954 and the new pattern shaping up for the ice business of the future, much interesting discussion was provided.

The subjects discussed covered modern trends in merchandising, road signs, selling ice through retail outlets, vending machines and manual type refrigerated storage boxes. The necessity for ways and means of cutting costs in processing ice came in for extensive discussion.

Three new directors were elected: H. J. Weindel, Chicago; Karl Pflanz, Belleville; L. A. Davis, Peoria. Another session will be held early in the spring.

The association has entered into an agreement with M. C. Geuther, extension specialist in fruit and vegetable marketing, Department of Agricultural Economics, University of Illinois. Mr. Guether will hold dealer training meetings in any city where cooperation may be obtained. Sponsors of these meetings are usually the wholesale fruit and vegetable people, and ice companies.

Florida Safety Record

RECORDS of the Florida Industrial Commission for the first six months of 1954 show that the Florida ice industry reported 60 disabling injuries which cost 1685 lost days. In the same period of 1953 there were 136 disabling injuries, causing 8376 lost days. Safety efforts therefore presented 76 lost time injuries and saved 6691 employee days. This savings helped management and employees alike, the report points out. The employee suffers a financial loss when he is injured which just about equals the amount of compensation and medical expense that his employer pays because of the injury.

Canadian Directors Approve Advertising Campaign

THE BOARD of Directors of the Canadian Association of Ice Industries meeting at the recent convention in Niagara Falls, heartily approved the work of the Advertising Committee in 1954, and recommended a specialized program of cooperative advertising and sales promotion for 1955.

Survey of Ice Rinks Brings Information on Maintenance and Construction Details

PIPING in ice rinks, if properly installed and maintained, is giving long dependable service, a recent survey reveals. Corrosion, once a bugaboo to rink owners, seems to be under control. Piping installed 20 or more years ago is still giving satisfactory service. A majority of the installations reported were of steel pipe, followed closely by wrought iron pipe, both of which showed long service records.

Most of the pipe used is of either 1¼-inch or 1-inch diameter. A separation of 4 inches between centers is used in half of the rinks that submitted reports, with the separations in other cases ranging from 2 to 8 inches. In all but a few cases, the lengths of pipe are welded together, rather than being attached by threads and couplings. Most of the pipe is uncoated. Brine is overwhelmingly favored over ammonia and other refrigerants. In most cases a corrosion inhibitor is used in the brine.

This information was brought to light by questionaires mailed to owners or managers of all United States and Canadian rinks with artificial ice installations, other than small studio rinks. Detailed replies were received from 52 U. S. rinks and 60 Canadian rinks, including a number of the largest in each country.

Steel pipe being installed in an ice rink. This is 1-inch pipe on 4-inch centers, typical of many rinks. The preferred modern practice calls for welding the lengths of pipe together, rather than attaching them by threads and couplings. A survey conducted for the Spang-Chalfant Division of The National Supply Co. reveals that steel piping installed 20 or more years ago is still giving satisfactory service.

Steel Pipe Predominates

In the United States, 28 rinks managers reported using steel pipe, with the earliest installation still in use dating back to 1923, and 19 reported using wrought iron pipe, with the earliest installation still in use dating to 1936. Two reported using "black pipe", one the use of both steel and wrought iron, and one reported using "used pipe".

In Canada, 31 reported using steel pipe, with the earliest installation still in use dating back to 1929, and 23 reported using wrought iron pipe, with the earliest installation still in use dating to 1931. One reported using "tubing", one "black iron heavy duty", one "aluminum", one "standard black pipe" and one "high carbon iron". Two managers did not identify the kind of pipe.

The greatest variation indicated in both countries is in the types of bases used. These range from simple installations, with the pipe resting on sleepers and covered by sand, to those using a variety of materials in carefully planned successive layers.

Concrete is used in one way or another in the bases of more than half of the United States rinks, but only about one quarter of the Canadian rinks. Sand, with or without other materials, is used by more than half of the Canadian rinks. Other materials used in both countries include cork, cinders, gravel, crushed stone, and asphalt. The reports listed a wide variety of corrosion inhibitors.

The survey was conducted for the Spang-Chalfant Division of The National Supply Co., whose Spang steel pipe is used in a number of United States ice rinks, in order to obtain information that might help each rink get the maximum service from the pipe used. The large percentage of returns received is believed to be unusual for a survey of this kind. The information gained throws considerable light on ice rink construction and maintenance methods.

Details from U.S. Reports

Steel piping installed in the Ballard-Sunset Ice Skating Rink, Seattle, Wash., in 1923 was tested to 150 pounds pressure in the summer of 1953 and was found to contain no flaws, according to Clarence S. A. Hislop, operator. Frank Hopkins is the owner. The rink has an ice surface 80 by 120 feet, using 1¼-inch centers. The pipe is laid over a base of hard pan and crushed rock, with a sand fill between the pipes. Ammonia is used as the refrigerant.

Lyle Wright, president and manager of the Minneapolis Arena, reports that the piping laid in 1924 is still in good condition, with no leaks in 30 years. The rink has a 90 by 195 foot ice surface, using 1¼-inch steel pipe, galvanized, with a distance of 4½-inches between centers. The pipe is laid in sand, on creosoted sleepers, and the ice stays in all winter. Brine is tested each fall and spring and treated as recommended.

Steel pipe laid in 1925 in San Pedro Park Iceland, San Antonio, Texas, is still in use. The rink has a 60 by 150 foot ice surface, using 1¼-inch steel pipe on 4½-inch centers. The base is of concrete, with the pipe on 2-inch screeds with 8-foot centers, and a sand fill. The pipe has been painted three times since its installation as a protective measure. Refrigeration is by ammonia.

Polar Palace, Los Angeles, with a 90 by 235 foot ice surface, has used the same 1½-inch steel pipe since

1926, O. K. Evans, general manager, reports. The pipe is laid on a wood floor, with a 3-inch separation between centers.

Rhode Island Auditorium, at Providence, with an 85 by 192 foot ice surface, has used its present steel pipe since 1934, according to Louis A. R. Pieri, manager. The pipe is laid on 4-inch centers, over a cement base. This replaced the original piping, installed in 1927, in which there were many leaks in the couplings.

The Philadelphia Skating Club and Humane Society, Ardmore, Pa., has used the same steel pipe since 1937, E. Nelson Edwards, architect and chairman of the buildings and grounds committee, reports. The ice surface is 85 by 185 feet. The 1¼-inch pipe is on 4½-inch centers, on 3 by 4 sleepers over a cinder fill, with sand to the top of the pipes. Ammonia (direct expansion) is the refrigerant.

Cleveland Arena, with an 86 by 190 foot ice surface, uses 1¼-inch steel pipe on 4-inch centers, installed in 1937. The pipe is bedded in 6-inch concrete with terrazzo top, according to James C. Hendy, general manager.

Whitney-Sutros Rink, San Francisco, ice surface 88 by 192 feet, uses 1¼-inch steel pipe on 4-inch centers, also installed in 1937. The base consists of a 4-inch reinforced concrete slab on top of palco bark insulation. R. A. Bratton, manager, reports that the alkalinity of the brine keeps between 7 and 10 pH, and that no corrosion inhibitor is necessary.

St. Louis Arena, with a 100 by 215 foot ice surface, opened in 1931, got less than seven years service from its original piping. But the replacement pipe installed in 1937 is reported still in use. This is 1¼-inch steel pipe, copper bearing, on 4-inch centers, in concrete slab, on a base of concrete with cork insulation between the two concrete slabs.

Emery F. Baker, manger of the skating Club of Boston, reports there have been small leaks in only two pipes, in one location only, in steel pipe installed in 1938. The rink has an 85 by 193 foot ice surface, using 1¼-inch pipe on 4½-inch centers. The pipe is carefully bedded in a 4-inch slab of concrete, resting on a slab of 4-inch reinforced concrete, above a cinder fill.

Canadian Rink Details

Steel piping installed at the Oshawa, Ont., Arena in 1929, was still in use up to September, 1953, when the arena burned, A. W. Hambly, manager, reports. The arena had an ice surface 85 by 196, using 1¼-inch pipe on 4½-inch centers. The base consisted of a 12-inch cinder fill with 4 by 4 sleepers on 5-foot centers.

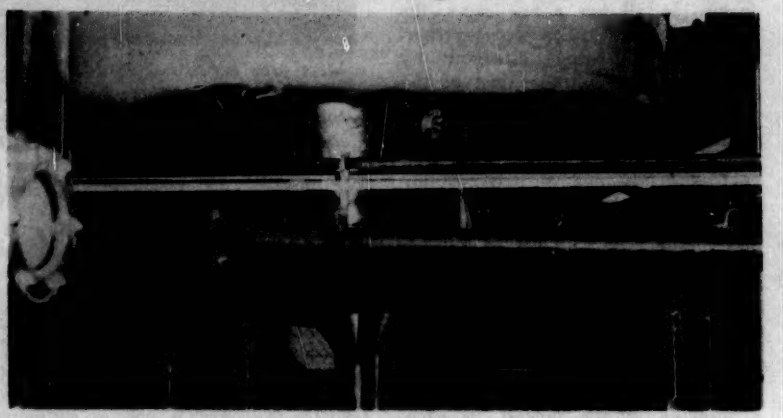
The Valleyfield, Quebec, Arena has used its steel pipe since 1936. The ice surface is 80 by 195 feet, over a base of sand. The owners are Arthur Vinet and Albert Leduc.

The Queens Park Arena, owned by the City of New Westminster, B. C., has used its steel pipe since 1937. The ice surface is 80 by 180 feet, using 1¼-inch pipe on 5-inch centers.

The Owen Sound, Ont., Civic Auditorium installed 1¼-inch steel pipe on 3-inch centers in 1938, threaded and coupled. The base consists of crushed stone and sand, with ties crosswise to the piping. Ted Steadman, manager, reports that when a terrazzo floor was installed in 1946, the pipe was in good condition, as it appears now. He says that no trouble has been encountered with pipe under the floor, but the pipe which was exposed, and covered with shavings, corroded from the outside in and had to be cut out and replaced.

The Vernon, B. C., Civic Arena installed 1¼-inch steel pipe on 4½-inch centers, welded in 1938. The ice surface is 80 by 180, with a clay sub-base and 18 inches of coke breeze. The pipes rest on creosoted 4 by 4 timbers, embedded in sand.

Lower Head of Evaporator Tank Collapses While Under High Vacuum



Collapsed head of cylindrical tank in fruit packing plant

COLLAPSE of the lower head of a large cylindrical tank used for the evaporation of orange juice occurred recently at a western fruit packing plant while the vessel was under a high vacuum. The head was so distorted that repairs were impossible and a new one had to be installed at a cost of $6,000.

Built of stainless steel, the vessel was 9 ft. in diameter by 30 ft. in height and operated under at 29.6 in. vacuum. It was kept in continuous twenty-four hour service during the season in the processing of frozen orange juice, except for an eight hour period every seventh day when it was taken off the line for internal cleaning and examination.

The failure occurred after one of the regular shutdown periods. With the maintenance work completed, a high vacuum was placed on the evaporator in preparation for use. However, due to mechanical difficulties elsewhere in the plant, the unit was left idle for several hours. Then, shortly before the operator planned to admit orange juice to the vessel he heard a "woosh"— like sound. He looked up quickly and saw that the lower head had caved in to a depth of 18 inches, pulling up with it the attached juice pot and connected piping. The pot was undamaged but the stainless steel piping was severely distorted.

Repairs for the most part consisted of fabricating and installing a new head and renewing the connecting lines. However, this involved considerable labor because not only did some 100 feet of stainless steel welding have to be ground and polished but the internal surfaces of the new head also had to be highly polished.

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Ice Company Adds Appliance Sales

A NEW appliance showroom has been added to the appliance wholesaling-retailing division of Colorado Ice and Cold Storage Company, at 1600 West Colfax, Denver, Colorado. Although Colorado Ice has been merchandising ice refrigerators for most of its operating history, this marks the first entry of the firm into the electrical home appliance field, according to Floyd Gillespie, who has been appointed head of the appliance division.

The new showroom which has excellent visibility from a main cross-town viaduct immediately in front, will feature complete, built-in natural-finish kitchen cabinets, drain boards, as well as appliances, a complete line of gas ranges in the economy bracket, and a similarly low-price electric refrigerator, according to Mr. Gillespie.

There will likewise be a full line of associated home equipment such as furnaces and automatic heaters.

This model kitchen is featured in showroom of Colorado Ice & Cold Storage Company.

The decision to enter the field, which will include both wholesale and retail operations, was prompted largely by the thinking of L. L. Baker, general manager of Colorado Ice and Cold Storage Company, who had much experience with appliance merchandising while with National Ice, on the West Coast.

Considerably facilitating entry into this new source of revenue was the fact that Colorado Ice and Cold Storage Company already owned a building ideally suited for conversion to an appliance showroom, only one block from the main plant headquarters.

Simple modication of the long, low modern building, which has some 1,500 square feet of display space, included only removal of existing signs, the installation of new marquee signs, projecting out from the facade of the building, an interior decoration job in white, and the installation of a handsome model kitchen.

To date, the number one item has proven itself to be a handsome barbecue unit, for which the company has assumed distributorship. The barbecue, which includes an electrically operated pit, a tripod-legged brazier, has sold so well that in the short time during which the company has been retailing from its showroom, more than three carloads have been sold.

Outside Sales Force

General plans call for an outside sales force, and an aggressive merchandising program, with dealerships throughout the state, Mr Gillespie indicated. For the opening week, factory representatives, of the lines carried in the Colorado Ice stock, were on hand to help set up sales operations.

The recent housing boom, still under full swing in the Denver area, has created a definitely open market for all appliances in lower price brackets, Mr. Gillespie reports. He feels that the entry of the Colorado Ice organization into this field will help substantially to increase earnings.

Cold Storage Control In Great Britain Ends

GOVERNMENT control of cold storage in Great Britain will end at midnight December 24, 1954. Thereafter the Government cold stores built during the recent war will be operated jointly by the Government and the cold storage industry through the medium of a managing company. The details of this arrangement are now being discussed with the industry.

The British cold storage industry has been controlled since September, 1939. Operators having more than a fixed cubic capacity (5,000 cu. ft.) were licensed, and the Minister of Food has exercised control over the use of the space and the charges to be made. With the de-rationing of all refrigerated produce and the running down of Ministry-owned stocks in cold storage by the end of the year, control of the industry will no longer be necessary, states the M. O. F. As a war-time measure, 47 cold stores with a total capacity of approximately 15 million cubic feet, widely dispersed for strategic reasons, were built for the Government. The additional capacity will become surplus to normal trade requirements.

The stores are at present managed on behalf of the Government by designated cold storage firms but after decontrol it is proposed to substitute for this arrangement a managing company. The company, in addition to maintaining the stores ready for use in case of emergency, will also use them as required. The joint management by the Government and the cold storage industry will insure that the stores will not be used in unfair competition with the industry.

The Government's policy with regard to the future use of the Government cold stores was referred to in a statement by the Minister in the House of Commons on May 17. To bring the above changes into effect, the Minister of Food has revoked the Cold Storage (Control of Undertakings) Order, 1948, with effect from December 25, 1954. The Treasury Charges Order (The Cold Storage) (Control of Undertakings) (Charges) (No. 2) Order, 1948, as amended is also being revoked with effect from the same date.

Dehydrofreezing Methods Adaptable To Commercial Adoption

COMMERCIAL adoption of dehydro-freezing methods with certain fruits and vegetables is well under way, according to a November release by Western Utilization Research Branch, Agricultural Research Service, United States Department of Agriculture. Concentrated strawberry juice and essence for improved products, and reduced manufacturing and handling costs, is also suitable to commercial operations, according to this report.

Dehydrofreezing Commercially

As the name implies, dehydrofreezing consists of freezing fruits and vegetables from which slightly more than half of the water has been removed, enough to reduce weight and volume by half. USDA's Western Utilization Research Laboratory in Albany, Calif., has conducted extensive research and has obtained a public-service patent on the method.

The researches have established that, for many fruits and vegetables, the point of optimum moisture removal is approximately 50 percent of the weight and volume. That is, if the products retain 35 to 40 percent of their original moisture they can be frozen, thawed, and rehydrated with retention of original quality. Thawing and rehydration can take place simultaneously and under control to obtain any desired final moisture level.

First commercial trials have revealed advantages or dehydrofrozen foods in re-manufacture and in large food-service establishments, with consumer packs a possible later development. Dehydrofrozen pimiento for use in cheese products, apricots for preserve manufacture, peas and carrots for soups, apples for the bakery trade, and various products for Quartermaster or institutional use have undergone, or are undergoing, trial at present.

Uniform Continuous Drying

In the investigations on dehyrofreezing at the Western Utilization Research Branch, quality of products has proved encouraging, whereas uniform continuous drying has proved difficult with some products. To meet these requirements, engineers in the Western Utilization Research Branch have developed a continuous rotary drier that has performed well.

In the drying step, prior to freezing, the extent of dehydration required is adequate before the temperature of the pieces rises to the point that causes changes characteristic of ordinary dried products; that is, adequate moisture is removed before the pieces cease to be moist. Commercial prune-drying equipment has proved suitable for halved apricots, which require three to four hours for the dehydration step. With commodities that can be dehydrated adequately in one hour or less, such as apple slices and pimientos, continuous drying equipment is needed to provide more uniform drying conditions and to reduce labor costs. Fruits susceptible to enzymatic browning, such as apple slices and apricot halves, also require sulfite treatment, which further complicates the drying step.

Details on construction of the new rotary drier and its performance with apple slices were presented by William C. Rockwell at the annual meeting of Institute of Food Technologists in Los Angeles in June 1954. Reprints of this and earlier articles are available from Western Utilization Research Branch, U.S. Department of Agriculture, Albany, Calif. The public service patent on the process (U.S. Patent 2,477,605, by L. B. Howard, W. D. Ramage, and C. L. Rasmussen, Aug. 2, 1949) can be obtained from the U.S. Patent Office, Washington, D.C., for 25 cents. Requests for licenses to apply the process should be addressed to G. E. Hilbert, Director of Utilization Research, Agricultural Research Service, U.S. Department of Agricultural, Washington 25, D.C.

Strawberry Juice and Concentrated Essence

A new method for removing and processing the sound culls in strawberry freezing plants results in better ultimate products (especially jellies), and also economies in shipping and handling this important by-product. Over the past two years, research conducted in Albany (Calif.) U.S.D.A. research facilities, in cooperation with industry, has achieved several objectives. Results of this investigation by L. H. Walker, G. H. Notter, R. M. McCready, and D. C. Patterson, are available.

One is the determination of conditions suitable for separation of natural volatile strawberry flavor. In the new processing method this essence is evaporated from fresh juice and condensed, concentrated, frozen, and handled separately. It can be returned to a product, such as jelly, in the last stage of its manufacture. Thus, the final product has pronounced natural aroma and flavor, because the essence has not been lost during heating applied in manufacture of the product.

Another step is concentration of the juice after the essence has been collected separately. The investigation showed that concentration under vacuum to one-seventh of the original volume is feasible. Maximum temperature that can be used during concentration, without harm to color and other characteristics was determined. This concentrate is frozen, and can be held or shipped with marked savings in cost as compared with unconcentrated juice. The essence can be recombined with the juice at this stage or shipped separately in a frozen concentrated form.

Preventing Cloudiness

Added achievement is a method for prevention of cloudiness and gelation in the fresh juice, which affect the quality of strawberry jelly. Use of the new method produces a clear sparkling juice that makes equally clear nongelling concentrate. These attractive properties are transmitted to the jelly or other product in which the juice is used.

This new process renders suitable for use approximately 10 percent of sound strawberries that are sorted from commercial processing lines. Such berries are unattractive in size or shape but are otherwise sound and can be used in the preparation of juice or puree. Because separation of essence, and concentration of both juice and essence, require complex essence-recovery and juice-concentration equipment that must be kept under precise control, this process is suitable only for commercial operation.

Frozen Peach Pack

THE 1954 pack of Frozen Peaches amounted to 36,118,993 pounds, according to a preliminary tabulation by the National Association of Frozen Food Packers. This total was about 12 percent larger than the 1953 pack of 32,170,960 pounds.

Moderate to substantial increases in production were registered in all major packing regions except the West. The aggregate 1954 total for Western states was only slightly greater than production in 1953.

Practical Refrigerating Engineer
NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

The Business Side of Engineering

C. T. BAKER
Member-at-Large NAPRE
Consulting Engineer
Atlanta, Ga.

THE alleged failure of practical engineers to comprehend and apply the laws of economics in the practice of their profession has led to severe criticism from businessmen. The bosses claim, "the engineer knows very little about the value of the dollar and seldom has a quantitative notion of what money invested in a business undertaking must earn, if the investment is to remain sound," or, "the engineer seems to think that management invests in almost any project in order to provide employment for skilled and common labor, and to pay high salaried executives."

There is ample evidence to support these complaints. So, for his self-preservation, it is essential that the engineer keep in mind the fact that money is invested in real estate, buildings, machinery and equipment for the sole purpose of earning a higher return than would accrue on an equal amount of capital invested in securities, government bonds, or long term municipal bonds, etc.

If such potential rewards were not possible, there would be no incentive to invest money, and consequently, for men to encumber themselves with the worries and hardships that attend the launching of a new enterprise or the maintenance of an established business; and the inevitably frequent outlays of cash for upkeep and the replacement of obsolete or worn-out equipment.

At this point, suppose we outline a few of the important factors that we, as engineers, should consider essential to good engineering practice. The overall cost of producing a ton of refrigeration falls into two main categories: Operating Expense and Annual Fixed Charges (see Tables 1 and 2).

TABLE 1—OPERATING EXPENSE ITEMS

Fuel	$
Electricity	$
Plant Labor	$
Supplies, etc. (incl. oil, waste, packing)	$
Water	$
Repairs and Maintenance (bldgs. and machinery)	$

No attempt is made in Table 2 to name the percentages applicable, as interest rates and other charges under the head of "fixed charges" vary somewhat in different sections of the country. And, since all plant engineers are familiar with the components of what is commonly considered Operating Expenses, an extended treatment of the individual items involved is unnecessary.

Interest

If a man borrows money, say $100,000.00, for the purpose of establishing a business and pays perhaps 5 percent per year interest on it, then the carrying charge becomes $5,000.00 per annum. If a company is organized and the Securities Commission authorizes the sale of bonds to mature in ten or twenty years from the date of issue, then the bond interest of, say 4 percent, for example, is a charge against operations and is included in the list of fixed charges.

The question is asked, "Should interest be charged during the construction of a project?" Yes, the company developing a new project must pay interest during construction and before the new plant goes into production.

TABLE 2—ANNUAL FIXED CHARGES

Interest on total investment (@ —%, per annum)	$
Taxes: Fed., state, local, business (@ —%, per annum)	$
Fire Insurance, per annum	$
Workmen's Compensation Insurance, per annum	$
Depreciation	$
(@ —%, per annum)	$

"Interest during construction is a recognized element of cost and should cover interest on funds provided for and used in the acquisition or construction of fixed capital, after such funds become available for use and before receipt, or completion, or coming into service of the property so acquired. During the construction period, reasonable charges for interest on the corporation's own funds used temporarily for such purposes, should also be included."

Suppose, as it often happens, that a group, or a single individual, has idle money in the bank or invested in short term securities, that he wishes to use in organizing, for instance, an ice company and constructing a plant. The sum is sufficient to cover all items of construction and provide the necessary operating capital for an extended operating period. Under fixed charges, can the interest on this capital so invested be included as a deduction on his Federal Income Tax Report? The Internal Revenue Department says "NO". Since no interest is being paid on the capital invested in the business, the management has no grounds for setting up an interest charge as a part of the fixed, or overhead, expense.

On the other hand, of course, interest paid on borrowed capital, or on bonds issued to finance a new undertaking, is recognized as legitimate expense and consequently, is deductible from gross income as long as such interest is paid.

Depreciation

When developing the cost of producing a ton of refrigeration, the engineer should give depreciation its proper place in the overall cost of production structure. To the inexperienced, the question of depreciation is puzzling. This is understandable, as engineers and accountants are not in agreement as to just how

A paper given at 44th NAPRE Convention.

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Chicago 44, Ill.
OFFICERS
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Los Angeles, Calif.
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Operating engineers of all refrigerating plants are invited to affiliate with the National Association of Practical Refrigerating Engineers, an educational association.

depreciation should be treated in cost accounting, although they agree depreciation of physical values is very real.

There are a few individuals, educated beyond their mental capacity, who attempt to surround depreciation with high-sounding words in an effort to make it seem a highly involved factor in cost accounting. Bombastic phraseology, however, fails to explain depreciation; it merely clouds the issue. The dictionary defines depreciation as, "The art of lessening or bringing down price or value; a fall in value; reduction in worth".

Several years ago, Lacy Morrison, writing in Power Magazine on the subject of power plant accounts, asked, "How much does it cost to wear a linen collar?" Then continues, "One who thought no further than the laundry bill would say 'three cents a year'; but a collar costs a quarter and will go, say, ten times to the laundry. Then, every time it is worn, two and a half cents worth of collar is used up. This is depreciation—used-up-tive-ness—and handled in this way, it is very simple, the only uncertainty being whether the collar will go ten times to the laundry.

Cites Depreciation Editorial

A recent editorial in a widely circulated newspaper gave a very clear and concise definition of depreciation. "Depreciation, in essence, means the setting aside of funds from current revenues of a company (or an individual) to cover the steadily decreasing value, through wear and tear, age and obsolescence of buildings and equipment." The editorial further stated, "The basic idea is to reserve a reasonable amount each year so that, when equipment wears out, the owner will be reimbursed its original cost and will be able to replace it".

The importance of depreciation is stressed in this discussion because, while the Plant Engineer may have no say in matters of cost accounting methods employed, he should be well informed in the basic economics of plant operation and the cost of production on the items produced in his department, whether a ton of ice, a ton of refrigeration, or a kilowatt hour of electricity. Regardless of bookkeeping procedures, the time always comes when the information is invaluable to him.

Disregarding the differences of opinion on the way to handle depreciation, it is quite obvious that some method must be provided for counteracting its ravages. A constant lessening in value takes place in all industrial activities due to use and increasing age of machinery. Further, regardless of type or for what purpose used, equipment often becomes inadequate or obsolescent long before the expiration of its physical usefulness.

Handling Depreciation

The two most universally accepted methods of controlling depreciation in the overall accounting of any business are: the direct or "straight line" method, by which the total annual cost of accruing depreciation is invested in plant betterments or extensions, and, the sinking fund method, by which only such an amount as will meet the demands of the Expectation of Life tables is set aside each year and allowed to accumulate at compound interest.

For example: A sinking fund which will provide funds for the replacement of equipment at the end of its probable life, is to be developed. Suppose that the owner of a new refrigerating plant elects to set aside an annual amount in a sinking fund that would be sufficient to replace his plant at the end of 15 years. Now, if he took out of his earnings $6.666.00 per year for the period of 15 years (or 6 2/3 percent of a $100,000.00 investment), he would have in the fund at the end of fifteen year $99,990.00, or practically $100,000.00.

On the other hand, if the money in the sinking fund were loaned out at 6% compound interest, only 4 1/3% would need to be charged on an investment of $100,000.00 to restore the original fund in fifteen years.

If the owner should assume a full twenty years of useful life from his plant equipment, with his annual depreciation rate based on 6 percent compound interest on the sinking fund, he would charge a depreciation rate of 2¾% on his investment to recover $100,000.00 in the twenty-year period.

Equipment Maintenance and Depreciation Closely Linked

Regardless of the thinking of some whose viewpoint does not extend beyond the purely theoretical in matters affecting accounting practices, the fact remains that depreciation of machinery and equipment is greatly influenced by the care that is given it.

Recently, I visited two Diesel power plants, each with an installed capacity of 400 k.v. One plant was fifteen and the other five years old. The plant with fifteen years of service behind it was good for many more years because it had been meticulously maintained. Not only that, it was producing the same number of kilowatts per gallon of fuel oil as it had when it went on the line in 1938.

The newer plant, however, has been neglected for the five years of its life. Unless the accumulated maintenance is recognized and immediate steps are taken to restore this plant to something like its original physical condition, its life expectancy will not be twenty years, or even fifteen, but probably eight to ten years.

I cite these case histories to illustrate an important fact—the machinery and equipment mortality tables, however well developed, are useless, unless their conclusions on life expectancy are based on at least a reasonable amount of maintenance. Progress in the arts and sciences determines obsolescence, but maintenance or the lack of it controls depreciation, regardless of all the fine-spun theories to the contrary.

Taxes

The engineer realizes, of course, that one of the principal burdens on business enterprises today is taxes. There are a multiplicity of taxes that must be paid annually, and while no effort is made in this paper to enumerate them, or to treat the subject, it is important that the engineer acquire an understanding of the accumulative effect of taxes on the overall cost of production. In the parade of fixed overhead expenses, it is a most impressive figure. The same is true of insurance, although it is not as great a component of fixed charges as taxes.

Good Commercial Engineering

Too often, engineers fail to exercise good judgment in selecting a piece of equipment that will be used only a few weeks, and possibly, only a few days in the entire year. Rather than select a pump, a compressor, or a boiler in keeping with the limited service it will be called upon to perform, they recommend a much more expensive piece of equipment merely because of its greater efficiency.

When making a comparison between the cost of a very efficient pump, for example, and one of less efficiency, it is well to consider the matter in terms of how many years it will take to amortize the difference in cost of the two pumps when the percentage of operating time annually is just a small part of the total hours in a year. It will often be discovered that the power or fuel savings, as the case may be, would never justify the extra cost during the twenty-five to thirty year life expectancy of a pump

intended for this type of service. However when a pump, compressor or any other equipment used in a refrigeration plant must operate around the clock for the greater portion of the year, efficiency plays an important role in overall costs of plant operation.

For example: Pump A has an efficiency of 60 percent, and pump B, 65%. Assume that the motor driving each pump is equal to the other in efficiency at the load required, and output of each pump in theoretical hp is 42.

Then,

$$\text{Pump A} = \frac{42 \times 100}{60} = 70 \text{ hp}$$

$$\text{Pump B} = \frac{42 \times 100}{65} = 64.6 \text{ hp}$$

The difference of 5.4 hp is in favor of pump B

$$\text{or } \frac{5.4 \times 100}{70} = 7.7\% \text{ hp savings}$$

If the pump operates twenty-four hours per day for three hundred days per year, and the current to operate the motor costs $.0125 per kwh, then the extra 5.4 hp (assuming a motor efficiency of 85%) would represent:

$$\frac{5.4 \times 100}{85} = 6.4 \text{ kw input}$$

$$6.4 \times 24 \text{ hrs per day} = 153.6 \text{ kw per day}$$

$$153.6 \times 300 \text{ days} = 46{,}080 \text{ kw per yr.}$$

$$46{,}080 \times .0125 = \$576.00 \text{ annual savings}$$

The annual savings in power cost favors the more efficient pump.

The above example can serve as a guide in determining the power savings for any given case. It will also permit a quick calculation on the length of time that would be required to amortize the higher first cost of the more efficient pump. After the extra first cost has been recovered through the lower operating cost on the more efficient pump, the savings are considered as net during life of the unit.

Expense and Capital Accounts

When an engineer is responsible for purchases in his plant, he should keep an exact record of his expenditures so that the Auditing, or Bookkeeping Department can assign them to the proper division of accounting.

For example: If cash is laid out for repairs to plant equipment, the engineer should provide an accurate record of the expenditure, accompanied by a statement covering just what the transaction involved. If a pump, compressor, or other piece of equipment needs to be replaced because its physical condition is such as

● The Peet Packing Company, a well known meat packer with three up-to-date plants in Michigan, has earned a fine reputation for its wide variety of high-grade meat products distributed by over 3,600 outlets in Michigan. Completely modern throughout in its meat processing and distribution facilities, Peet has standardized on Vilter compressors for refrigeration in all three plants to protect the valuable products it processes daily. Outstanding performance and reliable operation has built unquestioned confidence in Vilter refrigeration.

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to prevent its being restored to good operating condition or because of its inadequacy or obsolescence, the exact cost of such a replacement should be recorded and generally, in such cases, the charge is made to *Expense.*

On the other hand, if money is invested in equipment for the purpose of performing a service not heretofore supplied, or for increasing manufacturing capacity, such expenditures should be charged to *Capital Account.* These fundamentals should be a part of the engineer's business training.

Insofar as individual preference is concerned, the owner or management of a property may follow any plan they elect to use, except that when it comes to the matter of Federal Income Taxes, their accounting method must conform to the requirements of the Internal Revenue Department.

An example: A few firms during the war years expended considerable funds to provide certain services that had not before been furnished by them. In each instance there were new facilities involved which brought in revenue not formerly earned. The owners contended that the cost of the new equipment, although it provided entirely new services should be charged against *Operations;* in other words, it should be considered *Expense.* Independent accountants called in to audit the books for that year informed the management that the expenditure made as just described must be charged to *Capital Account;* they could not be accepted as an item of *Operating Expense.*

Old Values Questioned

Before concluding, I would like to revert to the subject of depreciation and re-examine this major segment of fixed charges in the light of testimony recorded at hearings on new tax legislation before the Congressional House Ways and Means Committee. Various economists, accountants and utility executives have testified on the importance of giving recognition to the changed value of the dollar when computing allowable depreciation deductions for income tax purposes. I believe that engineers will want to give serious consideration to the facts brought out in these hearings.

Dr. William Paton of the University of Michigan made the point that the recovery of the cost of capital, which is presumably what the depreciation allowance is intended to do, was not achieved under the present computation based on original cost. One of the illustrations that he used was to the effect that the owner of a boiler is supposed to recover the cost of using up the boiler just as much as the coal burnt in the boiler's grate, in determining the net taxable income.

"Depreciated Dollar . . ."

He said that due to the depreciation in the value of the dollar, the true economic cost of depreciable assets is not being properly amortized. Thus the actual result of the present method of computing net taxable income is that capital is being confiscated on a large scale for the benefit of the consumer.

The necessity of conversion in such circumstances, he said, in computing depreciation deductions for tax purposes has been officially recognized in some countries abroad but has not yet been done in this country, despite widespread discussion of the subject by leading accountants and other interested parties. In order to treat this condition equitably, he continued, it would be necessary to convert all the dollars to one level of purchasing power, namely the current 1953 dollars.

Leonard Spacek, of Arthur Anderson & Co., in testifying on the subject of depreciation accounting said:

"It is proper and sound accounting to compute depreciation on the basis of cost adjusted for the changes in price level. The accounting concept of computing depreciation to recover the original cost of property was sound under a stable price level. It does not perform its function of maintaining service capacity of property in periods of major changes in the purchasing power of the dollar.

"The computation of depreciation adjusted for the change in the price level since the property was built can be accomplished in a simple manner so that it can be easily administered. The principle of removing the inequities in the computation of depreciation resulting from varying price levels is not new. It is recognized in the present tax law—by the use of Mar. 1, 1913, value of all plants constructed prior to that date."

It was not attempted to present an all-embracing text on cost accounting here, but rather to emphasize the need for engineers to study and understand basic principles of the business side of engineering.

News Notes and Chapter Activities

Los Angeles

FRED HERR

FAST Food Freezing Facility Facts" was the discussion presented November 3, by George Paulick, assistant chief engineer, California Consumers Corp. His talk revolved about various types of industrial quick-freezing equipment available today, the good and bad characteristics of each.

In order to furnish background for developments in this field in recent years, Mr. Paulick gave some history of the frozen food industry. Beginning about 1930 the commercial possibilities in this field began to be noticed, and immediately quality, cost and volume presented themselves as problems. Finding answers to these requirements brought about many designs of quick-freezing facilicities, which fell into three general categories: convection freezers, which depend on movable media, such as air or liquids to effect heat transfer; conduction freezers, which through indirect or direct contact are able to remove heat from the commodity; and, combinations of these two.

For the purpose of illustrating points in his talk, Mr. Paulick showed Kodachrome slides of a number of existing installations at the California Consumers Corp. plants, and discussed the advantages and shortcomings of each in detail. The presentation included some reference to coil and fan design, velocity requirements, and defrosting methods and systems. This was followed by a comparison of the relative merits of free-flooded heat exchangers versus circulated refrigerant heat exchangers. His talk was concluded by submitting some freezing time and quality data taken from actual experience from use of both high and low velocity, manual and auto-

A group of Los Angeles NAPRE members who participated in one of the series of eight deepsea fishing trips sponsored during the 1954 summer and fall season. This group fished the waters off San Clemente Islands. Shown are: Joe Eckert, Bakersfield; Ted Ziegler, Ray Smith and Frank Orr; standing, Amos Eastman, Jim DeLorie, Mike Julius, Rudi Kettler, Charles Larson, Herbert Royden and Clifford Nordholm. Rudi Kettler, chairman of the chapter's Fishing Committee, reported that another series of trips will be arranged for 1955.

matic blast freezers, as well as shelf and plate freezers.

"Refrigeration in the Dairy Industry" was the subject presented at the previous meeting in October. Earl E. Bergstrom, chief mechanical engineer, Carnation Milk, Los Angeles, was the speaker. Because of this firm's varied activities in the production of dairy products for more than fifty years, all types of refrigeration systems and equipment are used in its various plants.

Mr. Bergstrom explained that Carnation Milk Co. has refrigeration systems installed in all of its major plants, as well as the smallest receiving stations. Most of these installations are simple systems. "In recent years", the speaker said, "The indirect method of refrigeration has gained prominence in the dairy industry". He explained that this method consists of cooling water by direct expansion refrigeration, and then circulating the chilled water through the various cooling units. He said that from a sanitation standpoint this method has gained preference because the circulated water contains no impurities. If leaks were to occur and the cooling water flowed into the product there would be no total loss of product due to contamination.

Temperature control for most of the Company's systems, according to the speaker, is by means of suction pressure regulators; and the larger compressors are usually manually operated. Most of the older compressors installed in these plants are slow speed VSA type, with condensers, evaporators, etc. of conventional design, he explained. However, in recent years they have constructed plants in the United States as well as foreign operations, in which they have installed new type high speed compressors along with the latest operational and protective controls.

Chief Bergstrom also described the types of equipment used in the company's anhydrous fat and dried milk operations, the fresh milk and the ice cream divisions. Distribution relay stations employ the use of entirely automatic systems, according to him. Some of these units are Freon, while others operate with ammonia as the refrigerant. Control is either pressure or temperature control, or both. The requirements of the system generally is to provide refrigeration for ice cream storage and a high temperature room for storing all milk products. In the larger plants, which process both milk and ice cream, compound refrigeration systems are installed, most of which operate with several different suction pressures because of the varied temperature requirements."

The speaker declared that in some instances, such as the packaging rooms for malted milk and dried milk products, air conditioning is essential because the products are extremely hygroscopic and humidity must be controlled within specified limits.

New Officers Elected

Los Angeles Chapter elected the following new officers December 1: President, Elmer A. Johnson, plant manager, California Consumers Corp.; 1st vice-President, Clifford P. Scott, plant manager, Union Ice Co.; 2nd Vice-President, Victor A. Stubblefield, assastant plant mgr., Pacific Fruit Express Co.; Secretary, Donald H. Byl, assistant mgr. of plants, Union Ice Co.; Treasurer, Emmett T. Quinn, plant manager, Pacific Fruit Express Co.; and Sgt.-at-Arms, Wallace R. Newton, Refrigeration Engineer, Terminal Refrigeration Co.

Messrs. Byl and Quinn were re-elected, respectively, to their posts which they have filled for many years. Mr. Johnson, who has served as 1st and 2nd vice-president and instructor, succeeded Frank Eccleston. All the elections were unanimous. The Nominating Committee was composed of Rudi Kettler, chairman, Ray Burnett and George Paulick.

The new board of directors is composed of Michael Julius, chairman, Lawrence H. Benedict, J. F. Granger and H. R. Murray. Retiring president Eccleston heads the 1955 advisory board, other members of which are past-presidents Frank Muzzy and Edgar M. Marrs. President-elect Johnson announced appointment of the following chairmen of standing committees: Educational, Lawrence H. Benedict; Entertainment, Ed L. Nelson; Membership, Frank G. Muzzy; Attendance, James H. Webb; Finance, William F. Losch; and Employment, Michael Julius.

Seven new members were initiated at the December 1 meeting, bringing the total already "in the bag" for the 1954-55 membership drive to 21, according to membership chairman Frank Muzzy's figures. The educational session featured National President, Regis Gubser, on "How To Reduce Operating Costs". Gubser concentrated his discussion on the causes, and methods of correction, of excesses in high discharge and low suction pressures.

Los Angeles Convention

November 17 was set aside as a convention rally at which were discussed plans for the 1955 National NAPRE Convention to be held at Los Angeles in November. Usual technical talks and educational program were dispensed with in favor of reports from the chapter's delegates to New Orleans, and some remarks from National President Gubser. Chapter President Eccleston cited the distinction that has come to Los Angeles in having not only the national president as a member, but also a national director, W. R. Burnett, and a vice-chairman, national educational committee, Guy R. King.

In their remarks, Mr. Gubser and Mr. King stressed that education is the foundation stone of NAPRE activity and service. The prospects for 1955 appear to be exceptionally favorable, Mr. Gubser declared, adding that the new year should prove to be a good one for increasing membership on both local and national levels.

In discussing plans for the 1955 convention, Mr. Burnett declared that two primary objectives face Los Angeles Chapter: (1) "We have to win the 1955 membership drive," he said. "The margin in 1954 between Los Angeles and New Orleans was so close that Louisiana won by virtue of two or three California applications that were received just one day too late to be counted; and, (2) we must put on a national convention to equal or surpass the wonderful one arranged by New Orleans".

Gubser, Burnett, King, Lawrence Benedict and Herbert Royden, who represented Los Angeles at New Orleans, were lavish in their praise of the splendid job the Southerners had performed. Mr. King also cited the effective collaboration of New Orleans ladies which contributed to the success of that convention. He suggested that this procedure could well be adopted by Los Angeles. A "Ladies Night" meeting, something Los Angeles Chapter has not had in the memory of its oldest member, was proposed, but no immediate action was undertaken on the suggestion.

Memphis

CHAS. CONLEY

TWO members turned to lecturing for our October 6 meeting. After H. L. Todd, the chapter's instructor, talked on pages 384-397 of the King course on the subject "Liquid Cooling", W. L. Welker, chief engineer, Forest Hill Dairy, went to the blackboard where he explained how milk is processed in a dairy and how it is cooled. Wm. F. Ryan, chief engineer, Tennessee Brewery, followed at the blackboard. He drew a sketch showing how beer is made, and why it is necessary to cool the beer in its making. At this meeting, George W. Foster, assistant engineer, Humko Co., was elected to membership.

In place of our October 20 meeting, a plant tour was made through the Tennessee Valley Authority steam-electric generating plant at Memphis. This is an old plant formerly operated by the Memphis Power & Light Co. A 160,000 Kva plant, burning natural gas under the boilers, the plant runs at full capacity 24 hours a day pumping electric current into the TVA electrical system. The plant is one of the most up-to-date plants in operation for its age. Our group spent 2½ hours looking the plant over and asking questions of R. O. Clower, Supervising Engineer. At the end of the tour refreshments were served.

On November 3, Instructor Todd lectured on complete refrigerating systems. He went into detail to explain and show the various complete refrigeration systems, direct and indirect, simple, compound, and cascade. Using the blackboard he thoroughly explained why some systems were used in one instance and why others were used for other applications. The chapter had Alvis J. Clay, C. E. Stacks, C. W. Sullivan and Chas. A. Conley as delegates to the 45th Annual Convention at New Orleans, La.

Our second meeting in November was another field trip. Through the cooperation of Johnie Landolina, supervising engineer, water plants, City of Memphis, a tour was made of the newest pumping station, Thomas H. Allen plant. This plant cost five million dollars. The building housing the equipment is a very fine permanent architectural structure. Pumping equip-

(See page 37)

From the President's Desk

New Year Brings New Resolutions —

THIS is the time of year that most chapters are installing their new officers. Let all of us get behind these leaders and give them all the cooperation we are capable of. I assure you that these leaders are not giving of their time for their own glory, but are gladly putting it in for the welfare of each of us and our organizations.

January is that time of the year when most businesses take stock, look over the records to find what has been accomplished; what mistakes were made, and what good was accomplished. They also make plans for the coming year. They make resolutions not to make the same errors again. They also resolve to do the right thing for the good of the Company from there on out.

Membership trophy winners for 1954 as they appeared at the 45th Convention Breakfast session; Francis A. Yost, national committeeman, presiding; Max W. Sofer, Louisiana chairman, with the Emerson Brandt Memorial Membership Trophy; the No. 1 award; Wm. Ray Burnett, Los Angeles chairman, and a national director, with the large chapter trophy; and, Bert C. McKenna, Chicago chapter president and a national director, with the small chapter trophy.

Now the moral of this message is let each and every one of us do the same with regard to our part in the NAPRE.

Each of us should ask ourselves if we have attended meetings as often as we should?

Have we invited a guest or prospect to attend a meeting with us?

Have we ever helped a fellow member with his problems?

Have we ever put in a good word for the NAPRE anytime we had an opportunity?

In short, ask yourself, "what have I done for the NAPRE in 1954"?

Resolutions by Members

If you can truthfully answer all these questions in the affirmative, congratulations! Keep up the good work. However, if you do not come up with the right answers for '54, now is the time to resolve to do better in 1955.

Say to yourself, "I am going to the next meeting."

If there has not been a meeting in your chapter lately, say, "I am going to help promote a meeting."

If you have not taken a guest or prospect to a meeting say, "I am going to take one this year".

Visit another plant each month. If the other engineer has a problem, help him lick it. He'll no doubt be interested in your problem, too. And, if he isn't a member — need any more be written?

If you are active in or attend other engineering groups, tell your brothers there of NAPRE.

What can you do as an individual? Volunteer for a committee. One little job is often a matter of success or failure of a committee's task, or a chapter's venture. Maybe it was that little thing you could have done.

Refrigerated Warehouses Objective of First Drive

Since the membership campaign has as its first objective engineers employed in the refrigerating warehouse and cold storage industry, that could be the committee for which to volunteer. With the initiation fee now at $8.00, admittedly, it will be ever so slightly tougher to get. That should be a challenge to your sales ability.

Local officers and membership committee chairmen will have brochures and applications (the new white application sheet — yellow are obsolete). Obtain what you need and bring in that warehouse or cold storage engineer. If he wants a free OPERATING DATA BOOK, your local chapter will provide him with one. Should he like a few free issues of our official organ, INDUSTRIAL REFRIGERATION, let your chairman know. Point out articles in each of benefit to him.

And don't forget to point out that he has an opportunity to participate in a refrigerating course with an individual text for him, gratis! Completion of the course makes the member eligible for a certificate of proficiency, a paper that will mean a great deal in many *practical* ways. You can't go wrong with these selling benefits.

Small Chapter Doubles Size

Chapters will compete as customary for membership trophies. For the past two years, New Orleans, Chicago and Los Angeles have held the trophies consecutively. It isn't because these chapters are large that they have been able to take top honors. It's because they have a higher percentage of their members participating. Chicago chapter, for example, put every member on a committee in 1953. As a result they doubled their membership that year. That's how they won the small chapter trophy which is based on a percentage increase. In 1954 they came within one or two members of repeating their previous record, that of doubling their membership. Your participation will assist your chapter with the same sort of honors.

We're all familiar with refrigerating systems. An efficient system is one which has each and every unit functioning at its very best. Each unit has its components which must perform at top ability. Our Association is such a system. You, individually, are the components; your chapter is the unit. Your participation is wanted, and needed. NAPRE success in '55, depends on YOU.

Regis Enbeer

ment is of the very latest design. This plant was built to accommodate the fast growing population of the city and was so engineered as to increase its capacity as the demand. The plant at this time is pumping 12 million gallons of water per day.

Election of the chapter's officers was held Wednesday, December 1. Elected to office for 1955 were Charles G. Moore, President; John A. Rollow, 1st Vice-President; E. S. Boland, 2nd Vice-President; Chas. A. Conley, Secy-Treas.; Alvis J. Clay, Chairman Educational Committee; and Claude F. Pace, St.-at-Arms. Delegates to the 45th Annual Convention at New Orleans made their report, on the educational and business meetings.

San Francisco

LEWIS BROOKS

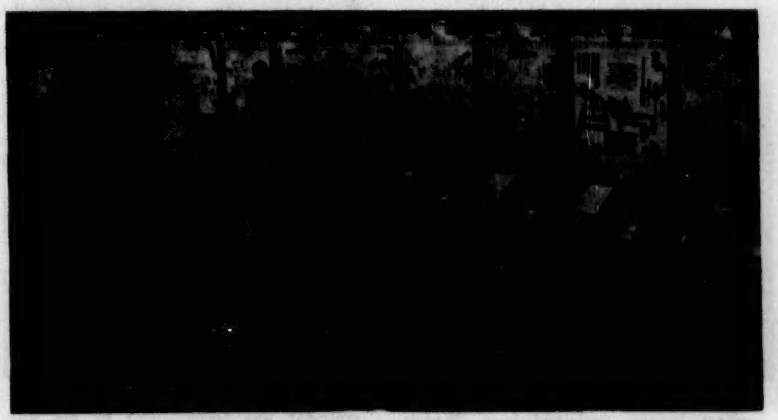
ON VETERAN'S Day, Frank Cordoza, Golden State Co., presented a one-half hour talk on the processing of milk. He was followed by Howard Boudreau, Cyclops Iron Works, who presented another one-half hour talk on the production of wine. Both talks emphasized the part refrigeration played in the processes. This was the first of our new programs designed to have all members present a talk on a subject with which they are most familiar. John Herzog and Bill Orton gave reports on the Convention. Bill had the distinction of being elected national membership chairman, for which the chapter gave him a rousing applause.

Detroit

LEON ADAMS

STONE Age tools along with a rare assembly of tools from the Copper, Bronze and Iron Ages, and models of the first machine tools were part of the traveling exhibit "Civilization through Tools", which was shown November 10 to the NAPRE chapter and local units of Refrigeration Contractors Association, Refrigeration Service Engineers Society and the American Society of Refrigeration Engineers. According to Charles M. Heemistra, Program Chairman, NAPRE, this exhibit is the first attempt to reveal how man's survival, his development and material welfare are considerably dependent on tools.

Typical of many fascinating items in the exhibit were stone age tools approximately 500,000 years old, and muskets produced for the first time on a production basis by Eli Whitney. Prepared by the Wilkie Foundation, a nonprofit research organization, in cooperation with leading museums and universities, the ex-



Detroit is first NAPRE chapter to view new traveling show. Mr. C. G. Schelly, Managing Director, Wilkie Foundation, lecturing on "Civilization through Tools".

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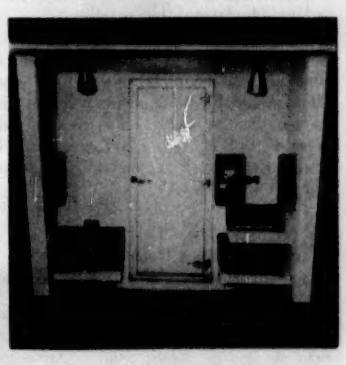

Perfection ICE-A-TERIA- a real quality name in the industry. This Vending Station is constructed with 6" of ultra light insulation (K factor .25) with 6" joists and studs, are vapor sealed to the inside ½" marine plywood layer. All nails are vapor sealed from the heads plus a 15# felt paper mopped to the outside of the ½" plywood. The outside of the station is completely covered with interlocked galvanized metal. The roof is your choice of galvanized metal or composition #110 Rex roofing on top of the 15# felt base. Station painted in your color.

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Floor has a 22 gauge sheet metal pan for protection against water seepage. A removable slat floor is placed on top of the pan.

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PERFECTION ICE SCORING MACHINE CO.

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hibit was presented by The DoALL Company, Des Plaines, Illinois, maker of modern tools. Managing director of the Wilkie Foundation, C. G. Schelly, lectured on the presentation.

The exhibit presented tools in a chronological arrangement to show man's developing intelligence indicated by the increasing complexity of his tools. The first stone tools displayed were descriptive of man at the threshold of progress. These were followed by stone implements which gave evidence of being deliberately fashioned to obtain sharp edges. Succeeding displays in the exhibit showed how man combined two or more elements to improve the effeciency of his tools.

"Civilization through Tools" then carried the story of man's evolution through the age of copper, bronze and iron a period of rapid progress. Modern civilization was introduced by displaying exact scale working models of the first "machine tools" that caused the fastest progress in man's evolution. Machines freed man from arduous physical exertion since they guided tools by mechanical means and moved them by mechanical forces. The story of this development, the basis of our modern economy, was augmented in a following display panel which described Eli Whitney's concept of mass production through interchangeable parts.

The fascinating story behind these tools and the effect they had on man's material welfare is also explained in a 24-page souvenir book that was given to those attending the exhibit.

Detroit Chapter scored another 'first" in this educational presentation.

Our own Bob Doremus, a member of National Committee, recommended the Alco film on controls which many chapters are now viewing. This extra curricular tool display activity was recommended in mid-1954 by the late Educational Director, Prof. H. G. Venemann. We recommend it to other Chapters.

St. Louis

KEN HOLADAY

"THIS plant is a model of efficiency and good housekeeping," commented Gene Kessler, chief engineer, Falstaff Brewing Corp., Plant No. 1. Gene was with other St. Louis Chapter members on a tour through the East St. Louis plant of Swift and Company. Leaders of the tour were Chapter President Stan Tatalovich, pipe shop foreman; Past President Gurdon Uplinger, master mechanic; and Instructor Erwin Menzenwerth, chief engineer. They were assisted by Bob Best, Bill Siesennop, Henry Nertzke, Claude Roberts, Ray Wayne, and Al Seimer, all of Swift and Company's mechanical department.

The inspection trip included all of the areas of most interest to the refrigerating engineer; chilling and cutting rooms, boiler plant, and engine room. The tour was preceded by a short business session and a showing of Swift's excellent film, "The Big Idea". The film dramatized Swift's big idea; "management's interest and concern in company employees, and in the development of the individual's dignity, welfare, and progress."

Members were especially impressed with the fine appearance of the engine room. Some of the equipment is very recent, and some quite old, but every machine has a well-kept look, and the plant has the atmosphere of a good place to work. At the close of the evening's program, the visitors enjoyed the generous hospitality of Plant Manager Henry Madsen, and Plant Superintendent Louis Harwich in the plant cafeteria.

Members-at-Large

BERT C. MCKENNA

PERHAPS the best way to start this column is to say that an unusually large number of this membership classification were present at the convention in New Orleans in November. From Washington, D.C., came those perennial attenders, Mr. and Mrs. Walter E. Bernd. Idaho was represented by Mr. and Mrs. Hubert Branham. Hubert is a national director, and incidentally, Mr. Bernd is a national past president.

Another national officer from the membership-at-large classification was our treasurer, Leland Kenagy, Kansas City, who attended with Mrs. Kenagy and their two youngsters. Evidence that members-at-large go far in this organization is shown in the attendance of Professor Harold P. Hayes, Dean of Engineering for California Polytechnic College. The professor was accompanied by his wife and was elected as national educational chairman, succeeding the late Professor H. G. Venemann.

One of our very good Canadian members journeyed all the way from Sarnia, Ontario, with his wife. They are Mr. and Mrs. R. J. Heartwell. Bob Heartwell served on the national membership committee 1954 and we understand that he is lined up for this work in 1955. Mr. and Mrs. George Gerstmayer, J.H.H. Voss Company, New York, were among other associate members-at-large in attendance. The convention also had the pleasure of entertaining Mr. and Mrs. Walter Brittain, Ardmore, Okla., Mr. and Mrs. Louis C. Roesel, Savannah, Ga., and Mr. and Mrs. B. E. Smith, Fairmount, Minn.

Perhaps the next member mentioned is no longer eligible for this column, but he was at convention time. He is Charles W. Moneypenny, secretary of the newly formed Greater Dade County Chapter, Miami, Florida. Charles' good wife accompanied him. The chapter was chartered at this convention. Mr. and Mrs. Paul S. Tosy, North Platte, Nebraska also attended, and John G. Muller, Kansas City, and Homer A. Whitlock of Laramie, Wyo., were in the stag line.

A foreign member-at-large, heard from recently, is Joseph L. Gichard, who is president of the New Zealand Institute of Refrigeration Engineers. It was certainly a pleasure to hear from Mr. Gichard and to learn of the many activities of his society in the refrigeration industry of New Zealand. We appreciate receiving correspondence from our members of this classification, and especially from those so far distant from the United States.

Concluding this month's column, I would like to add a few remarks received from member-at-large Bob Summers of Buffalo, New York. Bob writes "If your membership drops off, blame it on my mug in INDUSTRIAL REFRIGERATION (Nov. 1954). All funny business aside, here's my money order for $8.00 dues for the year 1955. Hope all members have swell holidays but not swelled heads."

Colton

HARRY BONTER

MEETINGS of October 13 and November 10 were held at the Santa Fe ice plant lunchroom. Aside from routine business, the entire time was given to refrigeration class lectures and round table discussions by Frank Scherer, educational instructor. Our attendance has been good, with 50 percent of the membership showing up. Could be the lunch that closes the meetings. Two new members inducted are Alfred L. Long, associate with Ted Cox Welding Supplies, San Bernardino, and Alfred E. Veatch, active, plant maintenance man, Sieck Packing Co.

Seattle

CHET BERTUS

SPEAKER for the evening, November 18, was member Bob Harrison, Sick's Seattle Brewing and Malting Co., who gave a talk on CO_2 liquefaction process. Mr. Harrison started his talk with some of the properties of CO_2 and then made a schematic drawing on the blackboard.

Starting with an enclosed fermenter, the CO_2 gas is drawn off the top through the suction line of a water lubricated compressor. The gas passes through a water washer and then to an activated carbon filter before reaching the compressor, removing the impurities. The gas is then discharged from the compressor to a dehydrator where a zero dew point is reached. From there it passes into a gas storage tank at 250 psi (approximately 350 lb of CO_2 gas at room temperature).

The gas from the storage tank is pumped to a shell and tube condenser, with ammonia used as the condensing medium. The ammonia is on the tube side, with the CO_2 gas on the shell side. A 5½ ton compressor is used for the NH_3 operating on a 0-lb suction and a 30-lb discharge. Discharge is into the suction of the main plant refrigeration system, through a float operated accumulator.

From the shell and tube condenser, the liquefied CO_2 goes to a storage tank, 5 feet in diameter, 20 feet long, with ten inches of cork insulation. The liquefied CO_2 is stored at minus 18 F at 240-lb. pressure. When full the tank will hold about 25,000 pounds of CO_2. In order to use the CO_2 again in the brewery, it must first be evaporated. This is done in a steam evaporator after which it passes to a use tank, and then to the beer cellars.

A new member, James D. Baker, was voted in. Baker is an operator at the Washington Co-op, Seattle. Election of officers for 1955 followed. Frank Knowles was elected president, John Tomca first vice-president; James Solomon second vice-president; and John Granger secretary-treasurer.

Chicago

BILL O'REILLY

FOR "beginners", this chapter has a 6:00 p. m. pre-meeting education session. A quiz was held with fine prizes for the winners; a printed picture of George Washington (expendable), and a glass fishing rod by Fiberglas. High-light of the October 26, regular meeting was a talk by Robert O. Gundlach, Worthington Corp., on "Developments in Large Compressor Applications." This was illustrated with pictorial slides.

On November 9, our preliminary class instructor was Dick Zach. He gave a three-question written quiz on condensers and after all the papers were in, worked out the problems on the blackboard. There were nineteen new members present for this class.

Member Gene Rytlewski, York Corporation, gave a very good talk on instruments and meters. He told of the different types, their application in different plants, how and where to install them. Another member, Stanley Mann, Illinois Bell Telephone Co., gave a short, but very interesting lecture on thermal relays and overcurrent devices.

Bert McKenna, Joe Farrell and Dick Kelahan each gave a short report on the Convention which was held in New Orleans. They reported that Jay R. Watson, Ideal Electric and Mfg. Co. and H. T. McDermott, publisher and editor of INDUSTRIAL REFRIGERATION, are now National Honorary Members. Out of four petitions which were passed by the National Board, for Honorary Membership, two of them were from the Chicago Chapter. We were also informed that we had won the small chapter membership trophy again this year. If Chicago wins it one more time, it will belong to the chapter permanently.

On November 23, Bert McKenna, Central Cold Storage Co., gave a talk on meat storage. Gene Rytlewski followed with a talk on operating all the different types of condensers, citing a few examples of things that are done wrong when installing condensers. Gene also showed an old drawing of a special low-headroom condenser (two-pipe type).

Nick Downes acquired a fire safety motion picture from Illinois Bell Telephone Co., where he is employed. The film had to do with the different types of fire extinguishers, how to use them, how to tell which type to use and how to put out the fire. National Vice-President Bert McKenna read a list of candidates for the Regional Educational Meeting which is going to be held here in Chicago, April 15-17, 1955. This gathering will consist of the chapters in the Midwest. Educational papers will be presented, and there will also be other activities of social and practical nature.

Texas Coastal Bend

VERNON KUMMEL

THE meeting of October 19 was called to order by R. A. O'Neill, President. Edward A. Campbell was elected as a delegate to the National Convention, and George Bartlett as an alternate delegate. A committee was appointed to make Pre-Christmas Party plans. They were V. M. Kummel, George Bartlett and Barney Majeskey. Two guests were introduced: J. E. Echols, Arkansas Pass, and Mario Scorza, Rockport.

Chapter II of the study course was discussed by Dan Miller. The properties of water, ether and ammonia were compared as to temperature and pressure for refrigerating purposes. The different components of a refrigeration system were explained and discussed with the aid of a blackboard. The questions at the end of the chapter were assigned to members for answering at the next regular meeting of the Chapter.

Milwaukee

L. J. ANDERSON

MILWAUKEE chapter held its regular meeting on October 27 at the Milwaukee School of Engineering. The education program was started and chapters 1 and 2 were discussed. John Alberte, Schlitz Brewing Co., acted as instructor. Mr. Allega, Johnson Service Co., gave an illustrated talk on refrigeration and air conditioning controls. He also presented an interesting demonstration of a stage controller.

A pro and con discussion was held concerning the feeding of air into the packing gland section on a pneumatically operated valve. The concensus of opinion

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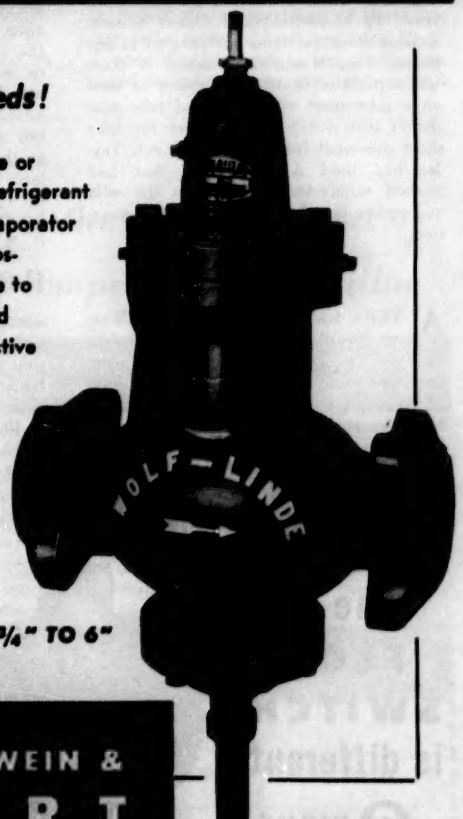

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seemed to be that no trouble would be encountered if the air supply was relatively dry. Also, pros and cons were heard on the amount of insulation to be used in covering suction lines. The overall gain in efficiency through covering these lines seem to vary in different instances.

Dallas

GEO. STEWART

THE meeting of October 18, as usual, was held at Alfords Refrigerated Warehouses. Movies on humidity were shown. One was entitled "Service Unseen" (Carrier) and the other "It's in the Air" (Chrysler). Both of these films were really interesting and educational.

On November 1, we were treated to a spaghetti supper prepared by a couple of excellent cooks, Mr. and Mrs. John Walstrem. The chapter really appreciated Mrs. Walstrem's preparation of such a nice supper, and take this opportunity to express it. E. R. Hollwell conducted a review of study course on compression systems. He covered pressure cycle, temperature cycle, liquid-vapor cycle, standard ton conditions; single stage, two-stage and cascade systems. He also illustrated for what each system is used, and the difference in cost.

Tom Weatherford gave a brief report on the convention at our November 15 meeting. L. P. Reiss conducted the lesson followed by a question and answer session. Among those questions not covered in our books, Tom Weatherford asked if there was a paint or coating that could be used on a tube sheet of a shell and tube condenser that would stay and keep the tube sheet protected from corrosion. Cecil Taylor had used Apexior paint that had worked satisfactorily. This was the only suggestion or answer we had to this question.

Olympia

A VERY fine publication "It's The Water News", house organ for Olympia Brewing Co., gives the new chapter some very fine news coverage. The presentation of their charter rated a 2-column article. Members mentioned on other pages were Les Mounts and Orville Ross. Both had their pictures displayed very prominently.

NAPRE

Question Box

The National Educational Committee, NAPRE, answers monthly in this column, operating problems forwarded by members. The Committee appreciates answers from the field. Address questions and answers to Prof. Harold P. Hayes, Dean of Engineering, State Polytechnic College, San Luis Obispo, Calif.

More on Question 1021

Liquid Trap Responsible For Lower Suction Pressure

QUESTION NO. 1021: In a cold storage and freezing plant, we used to make good time with 2 — 10 x 10 single acting compressors. Then as the plant grew larger, a third compressor, also a 10 x 10 single acting, was added; also a liquid trap. Now, before the trap was added, we used an accumulator and never got down to zero pressure on low side, but since the trap was added, we have to get 5 in. vacuum and cannot make the time we did. The trap is between the accumulator and compressors. Now does the accumulator form a pocket there, as the trap would work as an accumulator? Our high side runs from 120 to 150 psig normal; low side, 5 lbs. to 5 in. vac. We freeze sea food.— C. B., New Jersey.

REGARDING subject question, it appears that Mr. C. B. has reached the wrong conclusion as to why "we cannot make the time we did". The new liquid trap and the accumulator, singly or in relationship to each other, have no bearing upon refrigeration capacity. That new 10 x 10-inch compressor has added several dozen tons of refrigeration capacity to the plant.

One or more of the following causes can produce the condition described:

1. At the time the third compressor was installed, not enough new evaporator surface was installed to take care of the increased load. This alone would account for the pump-down to the subatmospheric pressure when the three compressors are operated in parallel on the evaporating system.

2. Capacity of the newly installed expansion valves are insufficient to provide enough liquid refrigerant to the new evaporators.

3. Circulation of air about the evaporators in the cooling and freezing rooms has been restricted so as to prevent rapid evaporation of the refrigerant necessary to hold a high suction pressure when all compressors are operating.

4. An accumulation of oil in the evaporators has seriously retarded refrigerant evaporation. This writer once drew off more than a barrel of oil from seven small ceiling-type Gebhardt units (forced circulation).

5. Temperature in a freezer has been lowered so as to require lower suction pressure. Lower suction pressure in turn reduces compressor capacity and would account for "failure to make the time we did."—O.L.B., Oroville, Wash.

Floor Heave Problem

QUESTION NO. 1031. We have a room, 14 x 12 x 7½ ft high, in the basement of a drive-in restaurant, which the owner wishes to use as a storage freezer. This room is lined with cement building blocks, there is a 3 inch slab of concrete on the floor and the ceiling is the restaurant floor. Earth surrounds three sides and bottom. The builder claims that the area is well drained, but dampness is appearing around the edges of the floor and in the corners. The floor is recessed 8 inches below the basement floor.

We are afraid to go ahead with this installation, without taking the necessary precautions to keep the ground from freezing. It has been suggested that we use electric heating cable. If this is feasible, please advise how much should be used and how it should be

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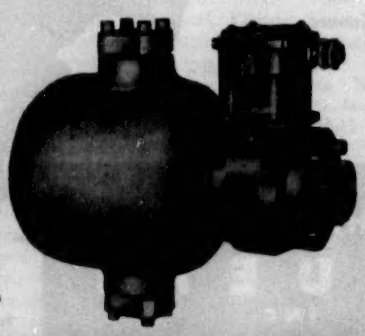

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installed. We plan to maintain a temperature of 0 to minus 10 F.—J.V.B., Detroit.

ANSWER: I doubt if the freezing of the ground under your floor would be very serious in such a small room if it is properly insulated. The floor, side walls and ceiling should be insulated with not less than 6 inches of good insulation.

However, it would not cost you very much to protect against freezing by using electric heating cable, which I understand can be purchased from most any electric supply house. One firm quotes a 60 ft. length, 400 watts output at $8.95 plus $8.50 for a thermostat. I believe that if you were to string this on top of your concrete floor before applying the insulation and finished concrete floor, it would do the trick. It should be laid around the room about 6 inches from the edge. You will require only 100 watts output per hour but the thermostat would take care of that.—The Late H.G.V.

Bulging Ice-Cans

QUESTION NO. 1032. Thank you for your answer regarding crankcase regulators which I sent in some time back. Now I have another!

We have a 20-ton ice tank here with brine as the secondary refrigerant and ammonia the primary. The brine is continuously circulated through the evaporator and kept in agitation. We freeze the water in 300-lb cakes, in cans approximately 1 x 2 x 5 ft., at 15 F.

Some of the cans have swollen due to the expansion of ice and are bulging out about the middle of the two foot side. What causes this? We have operated this plant for ten years and this is the first time.

What is the proper way of painting and maintaining these cans?—C. B., Alaska.

ANSWER: I think that your ice cans are bulged because at some time you permitted the ice in the cans to melt partly, because of high brine temperature, and then re-froze it. One should never allow the brine to rise above 32 F with ice in the cans, and then pull down the brine temperature before removing all of the ice.

Normally the slope of the cans permits the water while freezing to expand upward; but when the ice has been formed, and part of it melts, the water when re-frozen expands outward and stretches the metal. Unfortunately there is nothing you can do to restore the can to its original shape, and you will forever after be obliged to melt a greater amount of the ice in order to get it out of the cans.

I know of no paint that will stand up for long on ice cans. Perhaps aluminum paint will do better than most. For proper maintenance of ice cans you must hold the proper pH value for the brine and use an inhibitor to prevent corrosion. Much has been written in the NAPRE text books and in our Year Books on this subject.—The Late H.G.V.

Small Plant Operator Has Suction Problems

QUESTION NO. 1033. I have a 6 x 6 in. compressor working with an ice tank and a cold storage room. The compressor is rated by the manufacturers at 360 rpm, but I have it running only 250 rpm.

The ice tank is rated at five tons capacity. It is equipped with suction trap and lowfloat ammonia regulator. The ice tank is insulated with 6-inch insulation at the bottom and 12-inch on the sides. The cold storage room is 46 x 15 x 10 ft. high, well insulated with 9-inch insulating wool. Coils of 1¼ inch pipes on both long sides of the storage room constitute the evaporator. I maintain it from 38 to 45 F because it is only used for cooler purposes.

It happens that when the ice tank is working by hand operation, in case the float valve is taken out for repairs, I can get 18 to 20 psig in the suction line to the compressor. When the ice tank is working with the float valve, I cannot get less than 30 to 35 psig. The high pressure of the double-pipe condensers of 26 tubes 2 inch OD and 20 ft. long each, varies from 165 to 180 psig. When the cold storage room is empty I shut off the liquid entering to it and the temperature of the room naturally raises sometimes over 80 F. I note the ice tank is not giving the rated tonnage when the cold storage

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room is working, although the output of the ice is done correctly.

Although I reach the conclusion that the 6 x 6 compressor working at only 250 rpm has sufficient capacity to work with the ice tank and the storage room.

(a) do you recommend installing another compressor for the storage room?

(b) is there any reduction in the refrigerating capacity of a compressor due to the wear of cylinders and pistons?

(c) Is it good practice to shut-off the liquid entering the evaporator in the cold storage room when empty, instead of leaving it at the temperature stated? Would this disturb the suction temperature of the rest of the system due to the high temperature in the room when empty and the expansion valve totally closed?

(d) when the ice tank is working with its low pressure float regulator, does it give more refrigeration on account of its flooded condition although I cannot get the 18 to 20 psig that I get when it is hand throttled?—J. Gonzalez Prieto, Playa Ponce, P.R.

ANSWER: I estimate your ice making load at between 8.5 and 9 tons of refrigeration, and your cold storage room load at somewhere between 1 and 2 tons refrigeration.

A 6 in. x 6 in. compressor while operating 24 hours per day at 175 psig discharge pressure will give the following approximate operating results.

Suction Pressure	Evap. Temp.	Tons Refrig.	Brake HP
20 psig	5.5	10.6	16.5
25 psig	11.3	12.3	17.1
30 psig	16.6	14.0	17.6
35 psig	21.4	15.7	18.0

From the above figures it would appear that when operating at 20 psig the compressor is barely able to take care of the ice load and the storage room.

I do not know the temperature of brine nor the suction pressure that you must have in order to make 5 tons of ice per day. This depends upon (1) the size and number of ice cans in the tank, (2) the square feet of tube surface in the brine cooler, (3) brine velocity and a few other items of lesser importance.

However, ice tanks are usually designed to produce rated capacity on 12 to 14 degree brine temperature, and 5.5 degree ammonia temperature corresponding to 20 psig.

You say that you cannot get less than 30 to 35 psig when the float valve is working. At 30 psig the ammonia temperature is 16.6 F in the coils and at 35 psig it is 21.4 F. The brine temperature in these two cases will be from 8 to 10 degrees higher, and in either case you could not make 5 tons of ice per day.

You should get maximum results from your brine cooler if you use the float valve. But do not start to pull ice until the brine temperature has been lowered to about 12 F. By this time the suction pressure will be down to about 20 psig. Then pull the ice regularly at a uniform rate throughout the day and night. If you have 300 pound ice blocks you will pull one each 43 minutes.

Intermittent Operation

In case you do not care to pull ice regularly throughout the day and night, but prefer to pull it all out during the day, you cannot expect to make 5 tons per day, and the brine temperature and suction pressure will not be uniform. They will rise to a maximum when all of the cans are re-filled with water, and will gradually go down during the night.

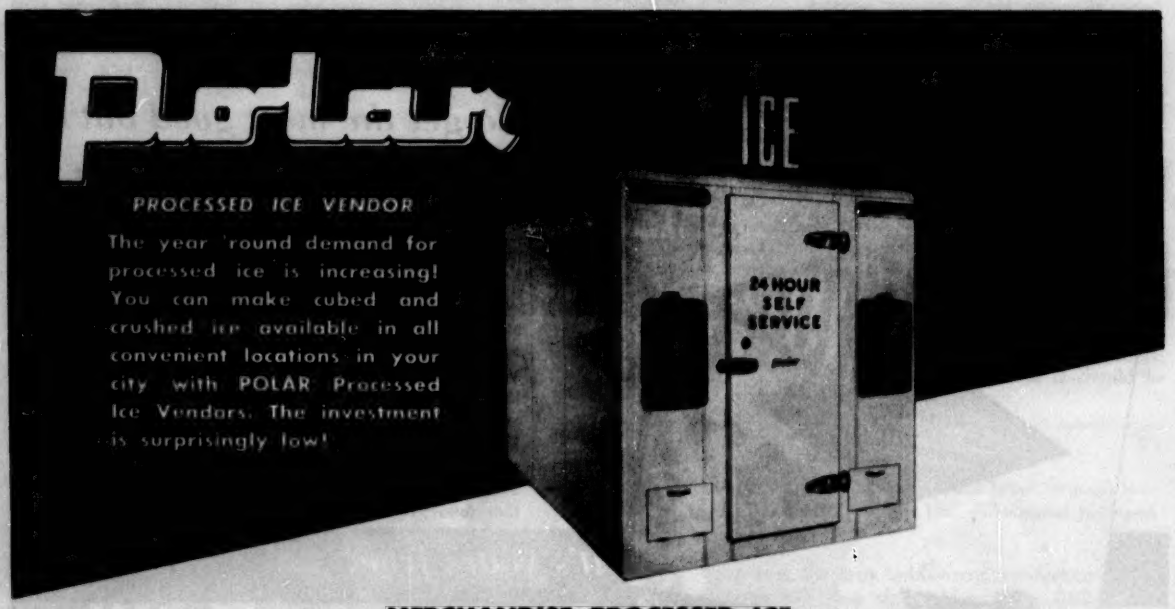
Answers to Questions

(a) It should not be necessary to install another compressor if you are able to get results with 20 psig suction pressure. Why not increase the rpm of compressor?

(b) Yes, the capacity of a compressor will drop considerably if the piston rings do not fit, or if the suction and discharge valves are not properly ground to their seats.

(c) The ammonia liquid should be shut off from the storage room coils whenever the storage room is not to be used for a considerable period of time. If it is empty for only a few days, it would be better to keep it refrigerated than to let it warm

(Continued on page 45)


Polar
PROCESSED ICE VENDOR
The year 'round demand for processed ice is increasing! You can make cubed and crushed ice available in all convenient locations in your city with POLAR Processed Ice Vendors. The investment is surprisingly low!
ICE
24 HOUR SELF SERVICE

MERCHANDISE PROCESSED ICE

24 Hours a Day

Available in two models: Model C-1 (single) Belt capacity 40 — 10 lb. bags. Storage 200 — 10 lb. bags. Model C-2 (double) Belt capacity 40 — 10 lb. bags on each belt. Storage 350 — 10 lb. bags.
Write or Wire Today for descriptive literature and prices. Dept. I-1.

REFRIGERATION ENGINEERING COMPANY
MONTGOMERY • MINNESOTA

Skating Rink Specializes in Curling

FOR 15 years the city of Wauwatosa, a suburb of Milwaukee, has maintained an ice rink for curling and skating, controlled by the board of park commissioners. The pipes are laid on concrete girders, five feet apart and gravel is filled up to the top of the pipes. When the ground under the rink has been frozen, flooding is started with light spray, and the ice is built up gradually by spraying so that there is never enough water to be flooded away. The pipes are all butt-welded for the length of the building, 146 feet, the total length of 1¼ inch piping being 18,980 feet.

Curling does not require any flooding, the ice merely requiring pebbling for the curlers, pebbling being the process of going down the rink with a container which has a head on it like the end of a sprinkling can, shaking hot water onto the ice. As the drops of water fall they form small pebbles on which the curling stones ride. The curling stones have a saucer-like indentation on the bottom and if it were not for the pebbles it would be almost impossible to heave the stones down the 146 feet of ice.

Preparing Wauwatosa Rink for Skating

It is the intention to keep the ice surface about ¾ inch thick. When it builds higher than that, it is cut down. For skating that is about the correct thickness but for curling one-half inch would do. The compressor is a 40 ton Vilter machine, with automatic electric control. The temperature is kept at 20 to 22F.

Ice Renewed

During the month of November, when the ice rink is started, there is only skating, and ice is renewed with a slight spray after each session, for seven nights a week and Sunday afternoons during that month. On December 1 curling starts, after which skating is permited only on Saturday nights, Sunday afternoons and nights until April 1, when the curling season ends. Public skating drops off almost entirely when the outdoor ice rinks are started, and those using the indoor rink then are mainly the figure skaters.

Because of the skating and curling considerable flooring or reconditioning of the ice is necessary, and the ice builds up. When it gets thicker than an inch or an inch and one half the refrigeration loses efficiency so it requires cutting down. For this purpose a machine is used with which the ice can be cut down one-half inch and all of the snow removed in about three hours. Such cutting down is required half a dozen times during the season.

During the months in which the rink is not used, a substantial floor, of the removable kind, is put back over the space occupied by the rink.

New Food Freezing

QUINCY Cold Storage and Warehouse Co., Portland, Me., is putting up a $300,000 addition to increase its food freezing facilities.

Canning Company Uses Ice For Processing Vegetables

ICE is being used in the canning of peas at the Hanover Canning plant, Hanover, Pa., ice being supplied by the Hanover Ice Company, says a recent issue of "Ice News", bulletin of The National Association of Ice Industries.

During the pea canning season, peas are hauled in to the plant from a radius of a few miles up to as much as 250 miles. The viners which shell the peas are located at the point of production. Since the peas are literally exploded from the pods, it's necessary to wash the peas to remove the hull juice if quality is to be protected. This is done by running the shelled peas through a revolving cylinder made of wire mesh above a tank of water. A pumping system sprays the water over the peas as the cylinder rotates. To insure high quality they make generous use of Ice. Crushed ice is added to the washer water; as the peas are washed, they are also pre-cooled with ice water.

Moving the peas from the washer to the plant is a streamlined operation. Much of the hand labor which was present when field boxes were used has been eliminated through the use of large insulated milk tank trucks. The trucks are rented by the canning company as they are used only about two months out of the year. During the peak of the season Hanover operated about 20 of these large trucks which haul from seven to nine tons of peas at a load.

As the trucks leave the plant, they are filled about one-third full of water, and a ton or a ton and a half of crushed ice is placed in the water. This precools the tank between the plant and the field. When it arrives at the washer, it pulls under the washer and the peas flow down a chute into the tank and into the ice water. When the tank is filled, it is closed like a giant thermos jug.

The hydrocooled peas when placed in ice water in a pre-cooled truck remain in excellent condition in transit to the plant. At the plant the truck is unloaded by simply opening the valve on the bottom of the tank. The peas and water flow into the plant. Furthermore, if the canning operation is behind schedule, the peas may be stored in the trucks for a reasonable time without damage.

Hanover Canning Company employs the same procedure in the handling of shelled lima beans. They plan to try it with string beans and possibly other small vegetables.

PIPE BENDING EXPERTS

Coils, Headers, Fabrications

Complete modern metalworking equipment, plus over 35 years of "know-how" assures the finest work to your exact specifications. Proven specialists in custom bending in any form, any metal, even stainless steel. We welcome the tough jobs.

May we quote on your next job?

CHICAGO NIPPLE MFG. CO.
1997 CLYBOURN AVE., CHICAGO 14, ILL.

Bateman's New Low-Cost

ROYAL

Model 50

ICE CRUSHER

Operates on a ½ HP., motor. Grinds 50 lbs. in 30 seconds. Makes a very good fine ice. Has all fine teeth for making the small ice that is so much in demand. Grate adjustable by turning handle on side of crusher. Chute for filling bags. Gears are encased in gear box and run in grease. Shelf to place ice on before entering hopper. Guard covers flywheel. Will take a regular 50 lb. block of ice. Shaft is moulded into the drum. Galvanized for the prevention of rust. Priced at $230.00 with motor. $185.00 less motor. Belt & pulley furnished. All steel shell, grate handle and legs. Semi-Steel drum and grate.

Bateman Write For Full Information

Ice Processing Equipment

MINERAL WELLS, TEXAS

Frozen Milk Concentrate

IOWA State College dairy industry researchers at Ames have reported that they have succeeded in putting milk in cans in concentrated and frozen form. The new development is expected to do for milk what revolutionized the orange juice business. It is expected by college dairy experts to help solve the problem of seasonal ups and downs for dairy farmers and provide them with a bigger milk market.

Researchers said the fresh frozen milk will keep perfectly for two weeks at temperatures under 40 degrees. For long-time storage, it will be kept in a freezer at 20 degrees below zero or colder. That way it will keep for three months, the researchers said.

COMING CONVENTIONS

MISSOURI VALLEY ICE MFRS. ASSOCIATION
January 10-11, 1955
Hotel President, Kansas City, Mo.
A. V. ESPHORST, Secretary

REFRIGERATED WAREHOUSING TRAINING CONFERENCE
January 10-13, 1955
Edgewater Beach Hotel, Chicago, Ill.
H. C. DIEHL, Director

SCIENTIFIC ADVISORY COUNCIL
January 13-15, 1955
Edgewater Beach Hotel, Chicago, Ill.
H. C. DIEHL, Director

HEATING AND VENTILATING EXPOSITION
January 24-28, 1955
Commercial Museum & Convention Hall, Phila., Pa.
E. K. STEVENS, Manager

SOUTHWESTERN ICE MANUFACTURERS ASSOCIATION
February 16-18, 1955
Robert Driscoll Hotel, Corpus Christi, Texas
P. A. WEATHERRED, Secretary-Counsel

SOUTHERN ICE EXCHANGE
February 22-23, 1955
Dinkler Plaza Hotel, Atlanta, Ga.
MILDRED NICHOLS, Secretary

GEORGIA ASSOCIATION OF ICE INDUSTRIES
February 22-23, 1955
Dinkler Plaza Hotel, Atlanta, Ga.
MILDRED NICHOLS, Secretary

NORTH CAROLINA ICE ASSOCIATION
March 7-8, 1955
Washington Duke Hotel, Durham, N.C.
LEWIS H. POWELL, Secretary

OHIO ASSOCIATION OF ICE INDUSTRIES
March 28-30, 1955
Biltmore Hotel, Dayton, Ohio
ELIZABETH SHANNON, Secretary

INDIANA ASSOCIATION OF ICE INDUSTRIES
March 28-30, 1955
Biltmore Hotel, Dayton, Ohio
ROBT. WALTON, Secretary

AMERICAN WAREHOUSEMEN'S ASSOCIATION
April 12-16, 1955
Edgewater Beach Hotel, Chicago, Ill.
WM. K. DALTON, General Secretary

NAPRE MIDWEST REGION ENGINEERS CONFERENCE
April 15-17, 1955
WM. L. TIFFIN, Secy., 37 W. Van Buren St., Chicago

(Continued from page 43)

up, and then be obliged to cool it down again. When the ammonia liquid is shut off the storage room coils the suction pressure at the machine will drop a few pounds, perhaps about 2 psi.

(d) The float regulator if working properly usually distributes the ammonia liquid better than a hand controlled expansion valve, thus getting maximum refrigeration results from the coils.

It is possible that the valve on your float regulator leaks causing excess ammonia liquid to flood back to the compressor cylinders, and high suction pressure. You can easily detect this by watching two things: (a) the frost line around the compressor cylinder, and (b) the temperature of the discharge gas at the machine. The discharge pipe should always be hot, too hot for your fingers to stand. It should be hot even though there is frost on the suction line all the way back to the cylinders. If the float valve leaks cut it out and re-seat it.

Remember what I said about the 30 to 35 psig with float valve in operation. If the valve does not leak and the float is set at the proper level the suction pressure will go down with the brine temperature.

I hope that I have given you the information you need to assist you in obtaining the best results. I would be pleased to hear from you again.—The Late H.G. Venemann.

New Questions

Odor Removal From Insulation Surfaces

QUESTION NO. 1034: We have a walk-in cooler here which has a bad odor due to meat spoilage over the years. It has cork walls exposed and we have tried everything, including baking soda, charcoal, airwick and so on. Do you have any suggestions along this line? The cork wall seems to have absorbed the odors and won't give them up.—C.B., Anchorage.

Twice As Cold As?

QUESTION NO. 1035: Please permit a fellow member to ask a silly question. Silly in most respects, but we have a warm discussion about it in our service department, and the men don't elect to take my word for the answer. Let's see if you back me up!

Question: Outdoor temperature at 7 am is minus 10 F. At 10 am it's twice as cold. How cold is it at 10 am?—J.E.S., Indianapolis.

Correct Chart Titles

QUESTION NO. 1036: In using pressure-entropy charts to describe and illustrate Freon refrigerant states of compression—condensing—evaporation in the cycle, is it correct to call these "Mollier Charts"?—D.B., New Orleans.

Purger Relocation

QUESTION NO. 1037: Purging connections in my ice plant are "highly" inconveniently arranged, with the purger perched high up among some tall girders. I have a desire to relocate the purger in a more accessible situation. Would any complications arise it I brought it down closer to the receiver and the floor?—Dan Chapman, Texas.

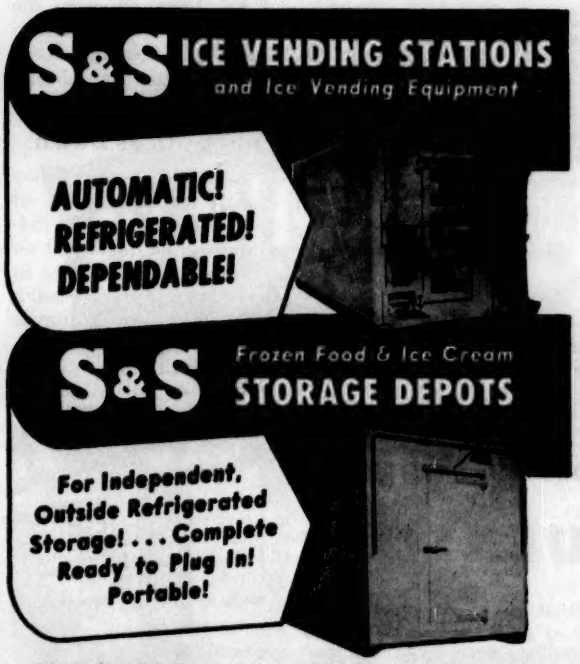
Detecting Faulty Valve Regulating Water Supply

QUESTION NO. 1038: What is a simple way of determining when cooling water valve to my compressor is jammed open?

Last month my city water bill, normally about 30-35 dollars, jumped to 92. My refrigerator serviceman located the water valve failure, but hasn't offered any method of detecting failure in the future.—B.N., Indiana.

California Consumers

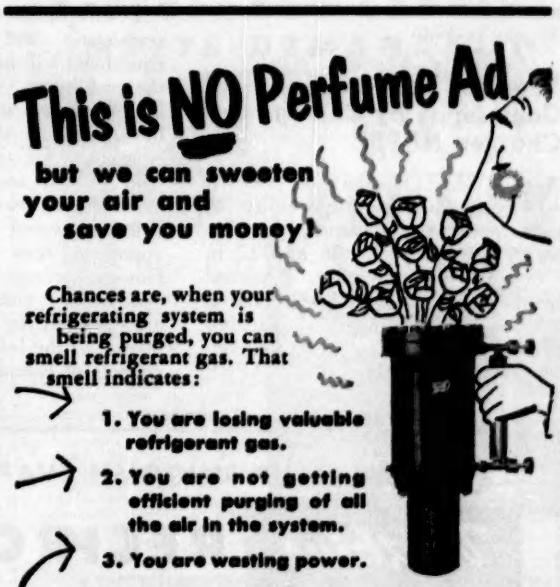
California Consumers Corp., Los Angeles, reported earnings for the fiscal year ended September 30, 1954 of $129,815 compared with $285,738 for the preceding year.


S&S ICE VENDING STATIONS
and Ice Vending Equipment
AUTOMATIC!
REFRIGERATED!
DEPENDABLE!
S&S Frozen Food & Ice Cream
STORAGE DEPOTS
For Independent, Outside Refrigerated Storage! . . . Complete Ready to Plug In! Portable!

Slash distribution costs . . . add frozen food profits for chain stores and super-markets!

Sold by Leading Ice Equipment Distributors Throughout the Nation

S&S VENDING MACHINE COMPANY


This is NO Perfume Ad
but we can sweeten your air and save you money!
Chances are, when your refrigerating system is being purged, you can smell refrigerant gas. That smell indicates:
1. You are losing valuable refrigerant gas.
2. You are not getting efficient purging of all the air in the system.
3. You are wasting power.

With an Armstrong Purger, one ice cream manufacturer reported head pressures reduced 40 lbs. and power costs cut 20%. Another saved $255 in ammonia the first year. Still another saves $500 in ammonia annually.

It's really worth looking into. *Send for Bulletin No. 221.*

ARMSTRONG MACHINE WORKS
860 Maple Street, Three Rivers, Michigan

Personalities In "Brass"

ELECTED President of NAPRE for this term is Regis Gubser, Vice-President for Engineering, California Consumers Corp., Los Angeles. A graduate of California Institute of Technology, with a Bachelor of Science in Electrical Engineering, Regis

Regis Gubser, president

has been a consistent contributor to INDUSTRIAL REFRIGERATION and the Operating Data Book, as well as a technical speaker at many NAPRE conventions. A member of NAPRE since 1932 he has held many offices in California Chapter No. 2 and was section chairman of ASRE at Los Angeles in 1940.

Regional Education Conference by Chicago Chapter, NAPRE

MIDWEST chapters of NAPRE will have an opportunity to participate in a regional education conference, April 15, 16 and 17 in Chicago. This conference, sponsored by the Chicago chapter, although it will receive no financial backing from the national body, has the consent and approval of the NAPRE Board of Directors. Chapters "overnight" in land-travel distance from Chicago will receive invitations.

Recently, the sponsors of the Conference met in Chicago. Bert C. McKenna, the National Vice-President, was elected chairman of the conference. The committee also selected C. Ward Stoner, Milwaukee, as the vice-chairman, and Roy T. Burns, NAPRE director, as a second vice-chairman. William L. Tiffin of Chicago was elected secretary for the conference.

Heating and Air Conditioning Exposition

OVER four hundred exhibitors have lined up displays for the 12th International Heating and Ventilating Exposition, to be the largest ever held. Advance information indicates that the announcements of many new products are specially planned for the occasion exceeding in effectiveness even the smart look of former heating and air conditioning shows. The exposition will be staged in the Commercial Museum and Convention Hall at Philadelphia, coincident with the 61st annual meeting of its sponsor, The American Society of Heating and Ventilating Engineers; the dates, January 24 to 28.

Leading manufacturers of heating, ventilating and air conditioning equipment will be represented among the exhibitors. A number of the larger displays will consist of general lines, covering almost every type of equipment for application in industrial plants, commercial buildings, or domestic housing. Other exhibits will be devoted to single classes of apparatus, such as boilers, furnaces, blowers, compressors, or various "packaged" units, some of which are designed for the consumer trade, others for the industry itself, as components of complete systems.

Sub-Zero Treatment of Metals

(continued from page 20)

treatment of steels, however, remains a controversial issue. Some say it has no useful place in the heat-treatment of steels; other specify it as standard procedure. With the availability of practical low-temperature refrigeration equipment, it is believed that the use of sub-zero temperatures in metallurgical operations will expand and become more and more accepted.

ASRE Installs Officers

(continued from page 23)

chairman of the Program Committee, Committee on Rating and Testing Air Conditioners and the Awards Committee in 1949, first vice-chairman of Los Angeles Section, and chairman of the ARI refrigeration coil committee. Twice winner of the Wolverine Award, he has made many contributions to refrigeration technical literature.

Joseph R. Chamberlain installed as director, has been associated with the York Corporation since 1928. He is editor of Section VI of the ASRE Data Book Applications Volume to be published soon. In the past he has served as chairman and vice-chairman of the Standards Committee and has been active in the writing of standards. He is chairman of the American Standards Association's B9 interpretations subcommittee.

Orange Juice Prices Down

FROZEN orange juice prices may drop slightly around the first of the year. It looks as though the 1954-55 orange crop will be the largest on record, with most of the increase in Florida where frozen juice processing plants are mainly located. A drop is reported in grapefruit production and frozen grapefruit juice.

WAKE UP SLUGGISH EVAPORATORS WITH A

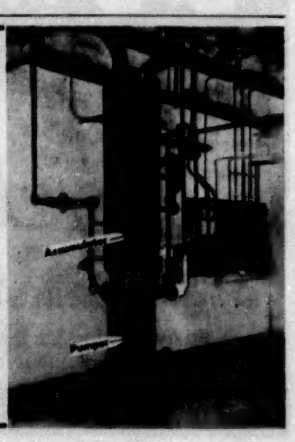
Watkins **RECIRCULATOR**

(PATENTED)

● TIME TO INSTALL a Watkins! Forces all evaporators to maximum efficiency with complete full-flooding. Refrigerant drives through the coil, washing out oil, thus giving maximum heat transfer. Watkins recirculates excess cold liquid to evaporators; protects compressor from slugs; permits fast hot-gas defrosting. No need for mechanical pumps or surge drums. THREE-YEAR WARRANTY ON ALL PARTS EXCEPT INDICATOR BULBS.

Write for Bulletin and Prices

J. E. WATKINS CO.—307-A LAKE ST.—MAYWOOD, ILLINOIS



National Frozen Food Convention March 13-16

THE 1955 National Frozen Food Convention will be held at the Conrad Hilton Hotel in Chicago, March 13-16, 1955. It will be sponsored jointly by the National Association of Frozen Food Packers and the National Wholesale Frozen Food Distributors. Additional participants will include brokers, warehousemen, retail and chain operators, suppliers, transportation representatives—and all others having a stake in the Frozen Food Industry. With the entire industry again meeting together, the 1955 Convention promises to be the greatest ever held.

Both the Packers' and Distributors' Associations are planning series of very important meetings, designed to be of the greatest possible value to the industry. And in addition, there will be the traditional social events which have been so successful at past frozen food conventions. The schedule of events includes an industry reception, March 13, industry breakfasts on March 14, 15 and 16 and the grand banquet on March 16. Registration will begin March 13.

An additional important feature of the 1955 convention will be the National Frozen Food Convention Exposition, sponsored by the National Wholesale Frozen Food Distributors. This will be an opportunity for every segment of the industry to exhibit equipment, products, supplies, etc.

Anderson Medal Awarded To Charles S. Leopold

THE F. Paul Anderson Medal, highest award of The American Society of Heating and Air Conditioning Engineers, has been awarded to Charles S. Leopold, prominent Philadelphia heating and air conditioning consulting engineer.

In making this announcement for the Society, L. N. Hunter, president of the organization and vice president of the National Radiator Company, said that Mr. Leopold had been nominated for this high honor because of his outstanding contributions to the advancement of human comfort in the fields of heating, ventilating and air conditioning.

A native Philadelphian, Mr. Leopold opened a consulting engineering office there in 1923. Since 1926 a very large part of his practice has been devoted to air conditioning. Some of the prominent buildings for which he has designed and supervised the installation of heating and air conditioning equipment are the Pentagon Building, Madison Square Garden, the U. S. Capitol, the New York Stock Exchange, and the Los Alamos Atomic Energy Commission.

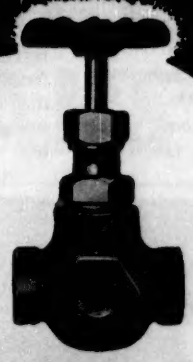
An interesting circumstance occurring in the handling of low temperature refrigeration and air conditioning at Madison Square Garden resulted in Mr. Leopold making a preliminary study of the control of tobacco smoke in this type of structure.

Deciduous Fruit Production

DECIDUOUS fruit production in 1954 will be about two percent larger than in 1953, but six percent below average, according to the U.S. Dept. of Agriculture. Crops of apples, pears, grapes and prunes will be larger, while crops of peaches, cherries, plums and apricots will be smaller. Of the citrus fruits, oranges for the 1954-55 season are expected to exceed last year's crop, but grapefruit volume will be slightly smaller. Lemon harvests are expected to be 12 percent less than last season. NARW Cold Facts.

Efficient Designs For Long Life And Low Maintenance

SHANK AMMONIA VALVES



By giving exceptional performance for many years under all types of operating conditions, Shank Valves have earned a reputation for high quality, long life and dependable products.

Built of highest grade materials with close tolerances—will stand most rigid inspections.

STOCKED BY LEADING JOBBERS

CYRUS SHANK COMPANY

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REFRIGERANT SUPPLY MEETS DEMANDS... Automatically with PHILLIPS FLOAT CONTROLS

The Phillips No. 101 Remote Feed Valve with Vertical Float Chamber is especially designed to control feed of liquid ammonia or Freon to shell coolers, large coil rooms and similar evaporation installations. Smooth, dependable modulating control is assured by several unique features:

No. 101 Valve in typical low side installation on ammonia flooded cooler.

- BY-PASSES FLASH-GAS. Operates smoothly with minimum disturbance from gaseous refrigerant.
- EXTERNAL LIQUID LEVEL ADJUSTMENT. Permits changing ammonia level without "pump-down".
- EASILY SERVICED. All working and replacement parts, especially needle and seat, readily accessible.
- INSULATION may be applied to float chambers, leaving valve exposed and accessible.

WRITE FOR CATALOG

H. A. PHILLIPS & CO. Designers and Engineers Refrigeration Controls Systems

3295 W. Carroll Avenue • Chicago 24, Illinois

REPRESENTATIVES: The C & S Equipment Co. 2103 S. San Pedro Street, Los Angeles, Calif.

Mason Emanuels Co. • 1000 Fourth Ave., South • Seattle 4, Wash.

Freezing Methods Aid Florida Fish Industry

RECENTLY developed freezing and cold-shipment methods have done much the same thing for Florida's $30,000,000 -a-year fishing industry that frozen concentrates have done for the state's citrus industry.

The growth is evident in Tampa, the home port of the biggest shrimp fleet, which has expanded as a result of quick-frozen shrimp that are processed in seven major new packing houses in the Tampa area, or shipped inland where a number of new plants specialize in preparing shrimp for quick cooking in the home.

Of Florida's commercial fishery as a whole, the State Board of Conservation at Tallahassee has this to say:

"The warm waters that wash Florida's long and intricate coastline have long supported a vast fishing enterprise. Giving direct livelihood to over 10,000 Floridians and contributing indirectly to the support of many thousands more, Florida's great salt water fishing industry ranks fourth in the nation."

"An immense wealth of boats, equipment and gear has been assembled for the harvesting of Florida's bountiful marine resources. "Over 870 documented vessels (five tons and over) were active in 1951. In addition, 5,850 boats, and Motor launches of various types, were used to bring the famous seafood to market. All told, the Florida fishermen produced at least 255,320,516 pounds of food and non-food products during 1952."

In the last two years, the expansion of the shrimp business has provided additional employment for at least 1,000 persons on the boats and in the plants that have sprung up. Each month in Tampa the shrimp fleet of boats has a payroll in excess of $375,000 and spends an equal amount for supplies.

The shrimp industry started in 1898 at Fernandina, Fla., on the east coast. Back in those days shrimp were sold off the boats for 40 cents a bushel and went mainly to barrooms as free bar food. Later they were iced and sold as far away as Charlotte, Savannah, Jacksonville, and Baltimore.

But after World War II, and with the discovery of the Tortugas beds and the beds off the coast of Mexico, the shrimp industry moved to Florida's west coast. Today in Tampa shrimp buyers for various markets are on hand all the time. More than 225 boats, based on Tampa's Hooker's Point, operate into the Gulf and still many others based elsewhere come into Tampa to discharge their cargo at the modern seafood packing houses.

Freezing Operations

At present Tampa has several of the most modern freezing plants in the world. One of the biggest shrimp-processing operations is that of the Florida Frozen Food Processors in a plant in Miami which has a $300,000 annual payroll for 180 employees. Florida Frozen Food is the parent organization for a group of subsidiaries, all grouped in the same Miami plant, which put out six brands of frozen breaded shrimp of their own and also pack for other name brands.

The company receives shrimp, in shells, in huge boxes. The shrimp are shelled, de-veined (by machine) and moved along on belts while employees bread, box and wrap them. The boxes are then moved into quick-freezing rooms where they are prepared for shipment to retail outlets. Florida's commercial fishermen hauled in a total catch of 206,887,362 pounds of all types of seafood, worth $31,523,056 at the docks last year.

Compared with the revised 1952 catch figures, latest year's take was 19 percent smaller in size but brought 22 percent more in sales at the docks fringing the state. All fin fish dropped in both quantity and sales, but shrimp and other shellfish showed marked gains.

Freezing Methods Tested

RECENT tests at the Georgia Experiment Station show that one method of freezing foods may take eight times as long as another. The tests made under the direction of Dr. J. G. Woodroof, head of the Food Processing Department at the Station, showed that food in one-pound, brick-shaped cartons placed side by side and flat on a refrigerating surface froze in two hours. When the cartons were stacked two deep the food took 16 hours to freeze.

Other important factors in the quick freezing method were the proximity of the unfrozen food to the refrigerating surface; chilling the food to 41 F. before placing it in the freezer, and limiting the amount of food frozen at one time to the available space next to refrigerating surfaces of the freezer.

One-pound, brick-shaped cartons of unfrozen food placed one layer deep on top of cartons of already-frozen food caused the temperature of the latter to rise about 13 degrees. In about 25 hours, the temperature of both packages dropped to 0 F.

Tests showed that the amount of food that can be placed in direct contact with refrigerated surfaces of freezers varies from 11.7 to 23.4 percent of the rated capacity.

No difference in the rate of freezing at different locations on the same refrigerating surface was found. Neither was there any difference in the rate of freezing in chest and upright freezers when similar cartons were placed in direct contact.

DIMCO CAST ALUMINUM FIN EVAPORATING COIL

★ *Saves Space*

★ *Saves Weight*

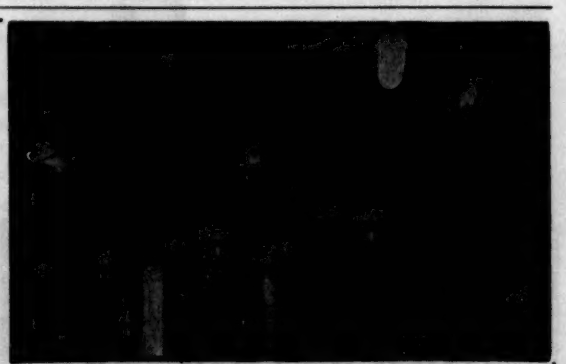
★ *Saves Cost*

CAN BE USED WITH ANY REFRIGERANT

Write for descriptive folder

DETROIT ICE MACHINE COMPANY

2615 Twelfth St., Detroit 16, Mich.



DIMCO Evaporators in a Frozen Food Storage Room at Great Lakes Terminal Warehouse, Toledo, Ohio. A typical installation facilitating palletizing.

Denver Commissioners Curtail Water Supply For Air Conditioning

THE absence of cooling towers and condensers, long a pecularity of air conditioning installations in Denver, Colorado, will come to a complete halt on June 1, 1955, as a result of a water-saving edict, passed in late November by the Denver board of water commissioners.

The new regulation, which dictates that every air conditioning or refrigeration system above two tons capacity must be equipped with a water saving device which will permit reclamation of 90 percent of the water used, was brought about by the serious water shortage which has been building in Colorado over the past two years. After much study of the situation, Earl Mosley, superintendent of the board of water commissioners, took the drastic step as a practical means of saving in excess of 12,000 acre feet of water per year.

The ruling as promulgated affects every refrigeration installation after December 15, 1954, and thus, will demand expenditures all the way from $150 to many thousands of dollars, in new buildings, factories, theaters, restaurants, cocktail lounges, etc., which have added air conditioning. Moreover, all smaller stores which have installed two-ton package units or similarly small air conditioning equipment will likewise be required to add similar water saving devices.

Even evaporative coolers, used to only a small extent in the Colorado area, are to be thus equipped. Mosley likewise indicated.

While refrigeration dealers throughout the city rushed off orders for water saving condensers, cooling towers, evaporative condensers, etc., Mosley pointed out that the cost of installing such equipment would in time pay itself out, inasmuch as the Colorado capitol has made the use of water meters standard for all commercial buildings, and residences which offer living space for more than two families. The saving in most instances will pay the cost of the water saver device within five to 10 years, he indicated. "We are not throwing a stumbling block in the way of refrigeration and air conditioning, but simply, eliminating one of the most serious wastages of water which has occurred in the past," Mosley said, "we are following the pattern which has been standard in other cities which do not have adequate water supplies for many years."

The regulation likewise will eliminate the "down the drain" disposal of water used in various industries, such as laundries, dry cleaning, canning, meat packing plants, etc.

Ice Directory For Truckers

FOR the convenience of truckers hauling perishables through Texas, a list of truck icing stations in that state has been compiled by the Southwestern Ice Manufacturers Association. It is designed as a means of planning icing stops. Cities and towns in which are located truck icing stations are listed in alphabetical order, each giving location and services available. Some include information as to eating, lodging and other accommodations.

A map of Texas carried on the center pages of the directory serves both as a map and as an index. It shows the major highways and the cities and towns in which the icing stations are located.

A similar directory has been issued by The Canadian Association of Ice Industries, listing all dealers where ice may be purchased.

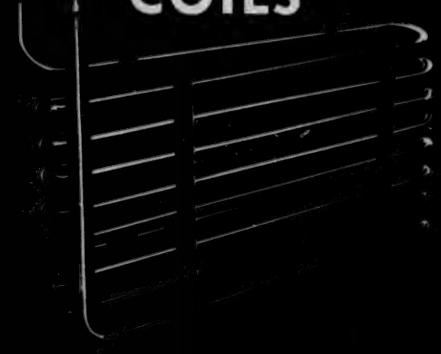
OHIO SPECIAL ICE CANS

WELDED — RIVETED ICE CAN GRIDS

Industrial Trucks and Trailers

THE OHIO GALVANIZING & MFG. CO.
NILES OHIO

REFRIGERATION COILS



NATIONAL QUALITY
NATIONAL PIPE BENDING CO.

DEATHS

Fred A. Wewerka

THE death of Fred A. Wewerka, for many years head of the Liebmann Ice Properties, located in Texas and Oklahoma, occurred November 3, at his home in El Reno, Oklahoma from a sudden heart attack. Lately he had relinquished these responsibilities to Paul Liebmann of Oklahoma City. His active interest in the ice business at the time of his death was in the Amarillo Ice & Cold Storage Company. Mr. Wewerka was recognized as a leader in the Texas Ice industries through his active membership in the Southwestern Ice Association as a director and a former president.

Joel J. Knight

THE death of Joel J. Knight, Sr., co-owner with his brother of the Knight Ice Company and the Center Hill Ice Company, Atlanta, Ga., occurred December 1. He was 51. Mr. Knight was a former president of the Georgia Ice Manufacturers Association. He joined his father, the late Thomas A. Knight, in the ice manufacturing business 32 years ago. He was a former president of the Civiton Club, former director and chairman of the board of the West Fulton YMCA and a member of the Oakland City Lodge of the Masons.

Charles F. Foley

THE death of Charles F. Foley, president of the Mid-City Cold Storage Company, Chicago, occurred Monday morning, December 6. He was 60. Mr. Foley had been in the refrigeration warehousing industry for some 25 or 30 years, serving as vice-president before becoming president of Mid-City. He was a member of The National Association of Refrigerated Warehouses and of the Chicago refrigerated warehouses group. He was an Elk and a member of the Lake Shore Club. He leaves his widow, Mrs. Charlotte Foley and one daughter.

EDGAR RANDOLPH THAYER, Yonkers, N.Y. died November 10. He was 69. Mr. Thayer was for many years an architect with Van Rensselaer H. Greene, refrigeration engineer, of 11 Park Place, New York.

CHARLES A. BAKER, former Mayor El Monte, Calif. and retired ice manufacturer died at his home in Los Angeles November 24. He was 80.

EDWARD GEORGE SCHNITZER, prominent resident of Palmyra, Mo. died November 22 after a long illness. He was 70. In 1907 he took over the ice and cold storage plant started by his father, himself and brother, and operated it until 1944 when he retired because of ill health. He served for 17 years on the Palmyra City Council.

News of People

MILAN D. SMITH, Pendleton, Oregon, became executive assistant to Secretary of Agriculture Ezra Taft Benson effective December 1, replacing Lorenzo N. Hoopes. Since 1941, Mr. Smith has been general manager of the Smith Canning and Freezing Company of Oregon, at Pendleton, and of Smith Frozen Foods of Oregon and Idaho. Also, he is on the board of directors of the National Association of Frozen Food Packers.

IRVING C. REYNOLDS, chairman of the Franklin Ice Cream Co. of Toledo, was presented with the Ohio State University's annual dairy technology award of merit on the campus on Oct. 23. His selection was based on contributions he has made to the dairy processing and manufacturing industries.

L. J. BUNTING, president of the Yakima Artificial Ice and Fuel Co., has accepted an appointment to a newly created Washington-Idaho advisory council for the Pacific Telephone & Telegraph Co. The 10-man council will meet once a month to consider company construction activities and operational matters, and to make recommendations to management.

JOHN G. MULLER, who for some years has been district engineer for the properties operated by Southern Texas Ice & Service, Inc., a subsidiary of Southeastern Public Service Company, on October 1, became district engineer for Railways Ice & Service Company, with headquarters at Kansas City, Kans. Mr. Muller is a member of NAPRE and was active in the Rio Grande Valley chapter.

JAMES P. MCSHANE, Supervising Engineer, Swift & Co., Union Stock Yards, Chicago, is a new director of ASRE Region 5. The new Director is a past-chairman, Chicago Section. He succeeds R. W. Ayres, who resigned. The unexpired term will be 18 months.

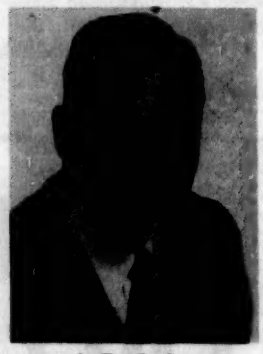
DUNCAN CAMERON MENZIES has been elected president, general manager and a director of Servel, Inc., succeeding W. Paul Jones who becomes vice-chairman of the Board. He formerly was executive vice-president and general manager of Ball Brothers, Inc., Muncie, Ind. from 1950 until June of this year.

CLAUDE L. MARCH is now manager of the Fischer Artificial Ice & Cold Storage Company, Dubuque, Iowa, replacing H. A. Harmison, who has resigned.

Carlson Joins City Products Elected Vice-President

THE election of A. R. Carlson as vice-president of City Products Corp. has been announced by William J. Sinek, president.

Mr. Carlson has had wide experience in the railroad and commercial ice field and also the cold storage and frozen food industries. He was formerly associated with the Merchants Ice and Cold Storage Company and the Pacific Fruit Express



A. R. Carlson

Company in San Francisco. During the years immediately following World War II, as a consulting engineer, Mr. Carlson directed the construction of several frozen food, cold storage and dairy plants on the Pacific Coast.

Recently he has been primarily associated with the retail and commercial ice business, railroad car icing and cold storage industries. He has had broad experience in mechanizing railroad car icing facilities and in 1948 helped develop and install the first modern railroad car icing machine. In 1951, Mr. Carlson served as president of the National Association of Practical Refrigerating Engineers and is a member of the American Society of Refrigerating Engineers. During the past three years he has served as vice-president of Southeastern Public Service Company in New York City.

Frozen Food Discussed At Chicago ASRE Meeting

BETTER Protection for Frozen Foods was the topic of Kenneth G. Dykstra, Manager of Birdseye Laboratories, in his presentation to the Chicago Section, ASRE, Thursday, November 11, 1954. Mr. Dykstra had recently completed a survey of handling conditions in the frozen food distribution services, from public warehouse to retail cabinets. He elaborated on some of the shortcomings which the Birdseye survey has pointed out.

As background for his remarks, Mr. Dykstra used slides to draw a comparison between frozen food packs in certain years and the amount of the consumers' dollar used for their purchase. He indicated that in 1942 fruit and vegetable pack was 348 million pounds and in 1952 exceeded two billion. Orange juice concentrate, in 1945 amounted to only 200,000 gallons, compared to 47 million in 1952, and 80 million gallons in 1954.

The speaker stated that the price of peas was 60 cents for a standard household container in 1932, as compared with 20 cents which the housewife pays for the same package in 1954. He pointed out that the frozen foods industry is now undergoing another large expansion, mainly in the institutional field. A cooked frozen foods development also seems to be under way; he cited, fish sticks, chicken, complete dinners, etc.

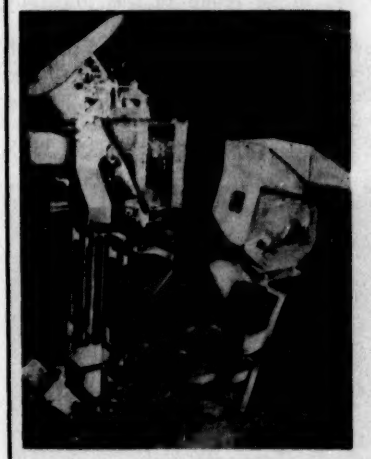
Today, according to Mr. Dykstra, four percent of the consumer dollar spent in the food industry goes to frozen foods. He stated that it was reasonable to expect in 1960 that the percentage would rise to 15. At present, his firm estimates 225 million cu. ft. of storage. Based on the anticipated increases, he indicated that it would be reasonable to assume that cold storage space would have to increase in the same proporation as the increase in percentage of the consumer dollar spent on frozen foods.

According to the speaker, transportation facilities are the weakest link in the distribution of frozen foods. In his opinion, the present refrigerator cars are not adequate. Out of 26,000 cars available, he indicated only 614 were mechanically refrigerated for low temperature commodities, and 300 more are on order. Personnel involved in the loading operation and checking of refrigerated cars should very well receive more elaborate education in their duties, he said. His remarks in connection with the trucking industry were of the same order. Service by the truckers was only mediocre and must improve. Break-up rooms or assembly points for mixed quantities of frozen commodities, was another weak link, according to the speaker.

Recommendations of Mr. Dykstra for handling frozen foods were essentially the same as those recommended by Robt. E. Reiman in his paper given before the 33rd Annual Food Processors School, Oregon State College. This paper appeared in October 1954 INDUSTRIAL REFRIGERATION under the title, "Storage Fundamentals for Frozen Foods".

Other statistics given by the speaker included remarks concerning an estimated 3,600,000 lineal ft. of display cabinets used to merchandise frozen fruits, vegetables and concentrates; an estimated 6,000,000 home freezers, which the speaker stated were a detriment to home storage since most actually operate above 10 F. Manufacturers would be striving in the future to lower this temperature, he predicted. Another recommendation was a back room low temperature walk-in freezer storage.

Ballard's Automatic Weighing-Bagging Equipment and Paper Ice Bag Sewing Machine — Will Make Money For You — In 1955



The Automatic Weigher — Bagger is FAST — ACCURATE — ECONOMICAL! Fills eight 25 lb. bags per minute — 6 tons per hour per unit — can be stepped up more — Has Scales for Accurate Weighing. Slashes Labor Costs — pays for itself quickly.

ENGINEERED FOR ECONOMICAL OPERATION UNDER ALL LOAD CONDITIONS. These units may be operated by one man or by several men, depending on your load. This means your labor costs in Winter will be comparable with your Summer processing cost.

ANOTHER BALLARD EXCLUSIVE . . .

The Only Completely Automatic Ice Bag Sewing Machine Available!
SLASH COSTS FURTHER . . . with Eskimo Sewing Machines.
Here are the reasons why this method is the "better way" for packaging your ice:

- **TAMPER PROOF — Customer gets full weight.**
- **SIMPLE TO OPERATE — Fully automatic. Put bag on conveyor, and it sews.**

— Up to 1200 bags an hour. Look at results of Eskimo Automatic Bag Weigher and Bagger plus our Eskimo Bag Sewer.

- **BAGS — are uniform in size, stacking evenly.**
- **NO CHANCE for a bag to open unexpectedly.**
- **Very economically priced!**

Fully patented — Made especially for Ballard Sales Company by LOCKWOOD GRADERS, GERING, NEB.

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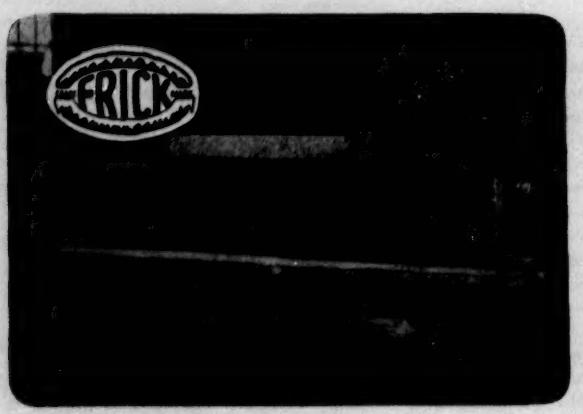

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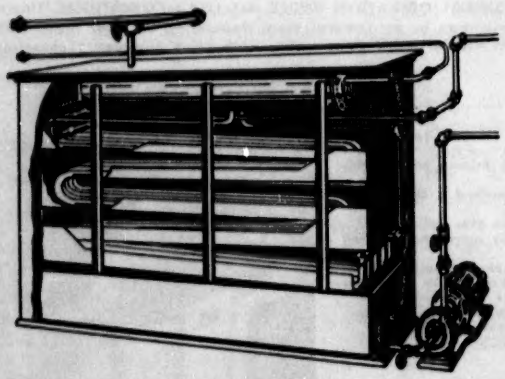
You Get Maximum Refrigeration with Frick Coils and Coolers

Because they have extra-large surfaces, scientifically arranged, and the most efficient controls: their design is the result of long experience; they are better made; and they are selected to suit needs with the greatest care. Special types built to order. Install Frick coils and coolers, and you'll get more refrigeration per dollar. Ask for estimates now.

Frick Air Cooling Units Are Built in a Full Range of Sizes: There's One to Suit Your Needs.



Efficient, Fast and Safe—Patented Frick "Instant" Water Coolers.

DEPENDABLE REFRIGERATION SINCE 1883

FRICK CO.

WAYNESBORO PENNA U.S.A.

Also Builders of Power Farming and Sawmill Machinery

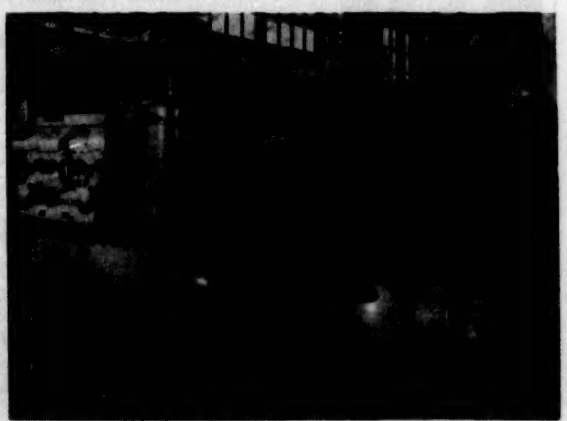
Modern Refrigeration Expands Peruvian Fish Industry

THE wealthy treasure of fish to be taken from the fabulous Humboldt current off the Peruvian cost has been there for centuries. But it wasn't until World War II, when the United States was forced to find new sources of food for its people, that Peru's modern fishing industry was developed.

L. R. Cowell is manager of Frigorificos Paita, Peru, S.A. This plant can freeze 40 tons of fish a day and store 1,200 tons of fish. Above is the Caterpillar D318 Diesel Electric Set, one of the three which provide electric power for the plant.

This industry wasn't a new discovery, but a rediscovery. A thousand years ago, Indians of the highly efficient Inca empire worked these waters. They dried and salted tons of seafood which they carried hundreds of miles up the Andes to the city of Cuzco. The Spanish conquistadors stopped all this when they came to Peru in the 16th century. Their only interest was in the gold and silver to be found in this minerally rich country.

With this rediscovery of the fishing industry, through aid from the United States, came a complete change of life along the Peruvian coast. Thousands of fishing boats started to work the waters abundant with tuna, bonito, swordfish, corvina, machete, pompano, sea bass,



Frigorificos Paita, S.A., a refrigeration plant in Paita, Peru, which freezes fish, has its own power source in the form of three Caterpillar Diesel Electric Sets. Here is the 185KW Cat D375 Electric Set.

anchovies and many other types of fish. Thousands of people were taken into the industry in refrigeration plants, in canneries, on the docks, in fish markets and many other businesses directly or indirectly connected with fishing.

Development Based on Modern Refrigeration

One of the reasons fishing had never really taken hold in Peru before World War II was because there was little refrigeration or sanitation in the markets, fish were generally suspect. About 13 years ago there was hardly a ton of fish a day eaten in greater Lima. Today fish consumption in the same area tops 40 tons daily. Besides the increased consumption of fish at home, the Peruvians also started to develop a big export trade in fish. Why these sudden developments? Modern refrigerating and canning methods were introduced with the fishing industry.

The developing of freezing plants has been particularly rapid in recent years. A typical example of this type of business is Frigorificos Paita, S. A., a refrigeration plant in Paita, Peru, one of the four largest fishing centers in the country.

The company started operations in June, 1951 and has grown to a point where it now can freeze 40 tons of fish in a day. There is more expansion in its future too, a boost of its freezing capacity to 90 tons a day.

The export of frozen fish in the course of the last three years has become second only to that of canned fish exported. Frigorificos Paita exports the bulk of the fish it processes. Consequently it maintains a large storage space which will hold 1,200 tons of frozen fish.

The plant handles mostly swordfish and tuna, which are caught seasonally. However, because of the plants large storage capacity it is able to operate the year around

The electric power to operate the plant comes from three diesel generating units, a 58KW Caterpillar D318 Electric Set, a 100KW Cat D17000 Electric Set and a 185KW Caterpillar D375 Electric Set.

These units provide power for five compressors, pumps, machinery in the repair shop, blowers, general lighting at the plant and lights in the homes maintained by the company for the employees. The plant has three Frick 8x8 compressors, each driven by a 75 hp electric motor and two Baker $5\frac{1}{2}$x$5\frac{1}{2}$ compressors, each driven by 25 hp motors. All these motors are manufactured by U. S. Electrical Motors Inc. In total, the plant has 20 electric motors developing 350 hp.

L. R. Cowell, a native Canadian, is manager of the plant which employs 82 people.

Radiation of Foods

THE National Research Council has appointed a special advisory committee, including Dr. B. E. Proctor of Massachusetts Institute of Technology, on research on radiation of foods, and the QM Corps and the Atomic Energy Commission, working with other agencies, have embarked on a five-year program. Researches under contract are under way by American Meat Institute Foundation, University of Chicago, Hormel Institute, Iowa Agricultural Experiment Station, Massachusetts Institute of Technology, Ohio State University, Research Foundation, Oregon State College. This program is one of the very largest and reports have already been received from Dr. Kraybill and Dr. Proctor indicating that initial findings suggest the possibility of a pasteurizing rather than a sterilizing value.—TRRF Information Bulletin.

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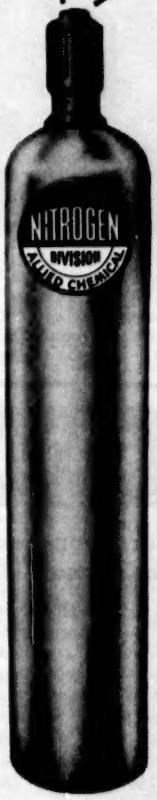
Anhydrous Ammonia



Made by the world's largest—and the pioneer—producer of Ammonia, Barrett brand is outstanding on four counts:

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—high speed delivery! Cylinder stocks maintained at all our coast-to-coast distributing stations. There is one near you ready to fill your needs promptly and regularly. 150-, 100- and 50-lb. cylinders. If you use *large* quantities, ask about our tank truck delivery service—*you'll save money.*

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Exceptionally low moisture content
—doesn't freeze up expansion valves, corrode equipment or ice up in evaporators. If purity is important to you—why specify anything but the best—especially when the best costs not one penny more.

Valuable Help! Send Today!

☐ Please send your free Ammonia Leak Detector Kit. (Pocket size, this handy kit can be used over and over again.)

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MANUFACTURERS' NEWS

Warnock Advanced By Armstrong Cork

THE assignment of broadened responsibilities to M. J. Warnock, vice-president of the Armstrong Cork Company since 1950 and Treasurer since 1943, has been announced by C. J. Backstrand, company president. As vice-president, Mr. Warnock is assuming responsibility for coordinating and strengthening the company's public and employee relations activities, in addition to the over-all direction of the company's financial affairs.

M. J. Warnock

Walter E. Hoadley

Walter E. Hoadley, Jr., was elected to succeed Mr. Warnock as treasurer, Mr. Backstrand announced. Mr. Hoadley will continue to serve as company economist and manager of commercial research.

Du Pont Sells Ammonia Facilities in St. Louis To Barada & Page

ANNOUNCEMENT has been made that E. I. Du Pont de Nemours & Co., Inc., Polychemicals Department have sold to Barada & Page, Inc., whose headquarters are in Kansas City, Missouri, their land, buildings, and equipment at the foot of Destrehan Street in St. Louis, which facilities were used for loading, storing and shipping cylinders of "National" Anhydrous Ammonia and the manufacture of Aqua Ammonia. The transaction included the buildings and grounds, equipment, the cylinders and complete customer lists.

Lists of all agents and customers in territories served from St. Louis have been made available to the buyer who has agreed to give the same service as that provided by Du Pont and on at least equal terms. The purchaser also has been assigned the right to the Du Pont trademark, "National" anhydrous ammonia, known for 65 years.

In May of this year it was announced that negotiations had been completed between Barada & Page, Inc., and Monsanto Chemical Company, for the purchase of Monsanto's Liquid Chlorine cylinders, and the establishment of a Chlorine filling station by Barada & Page, Inc. on its St. Louis property, and the taking over of Monsanto's Cylinder Chlorine business.

Worthington Corporation Opens Industrial Exhibit

A UNIQUE educational exhibit of basic industrial machinery was opened to the public by Worthington Corporation December 1 at 99 Park Avenue, New York. The new exhibit illustrates basic operating principles of machinery related to business, industrial, community and home life. Nearly all the displays are of the visitor-participation type where by operating the models himself, the visitor gains an understanding of various machines and how they are used.

A feature of the exhibit is a three-dimensional diorama, "Worthington City". Illuminated color photographs.

Sporlan Valve Holds Sales Conference

THE Sporlan Valve Company of St. Louis opened a five day company conference and national sales meeting on November 8 with a kick-off breakfast at the Gatesworth Hotel. After a two day series of company conferences, combined with trips through Sporlan's factories, the entire group consisting of the field sales representatives and members of the St. Louis organization, traveled to Pere Marquette Lodge in Grafton, Illinois for the three day sales meeting. One of the highlights of the sales meeting was a preview of two new talks on expansion valves and driers that will be available for presentation by Sporlan's field men throughout the country in the very near future. Keynoting the meeting was the theme, "Better Service to Customers Through Improved Techniques".

Sporlan Valve Personnel at sales Conference: Front row: C. C. Grote, W. L. Canfield, H. T. Lange, H. F. Spoehrer, W. T. Carmody, W. F. Wischmeyer, H. F. Shield, W. H. Krack. 2nd row: J. T. Barry, D. M. Lawson, P. J. McCarty, T. H. Silary, J. E. Dannels, F. A. M. Dawson, W. P. Schober, F. C. Hawco, J. J. Mays, W. A. Reichenbach. 3rd row: D. B. Rentschler, R. E. Niedermeier, J. A. Hogan, R. L. Vandiver, F. G. Jaeger, E. C. Fockler, A. L. Javes, M. D. McAnany, R. H. Parlin.

CATALOGS AND BULLETINS

Corrosion-Resistant Primer For Room Air Conditioners

A CORROSION-resistant primer, highly impermeable to water, and unaffected in a laboratory "salt spray" test after 500 hours, has been developed for air conditioning units by DuPont. The new primer, followed by an enamel coat, withstands 20 percent salt spray test at 95 F for 2000 hours, it is claimed.

The following steps in the finishing system are stressed in a semitechnical bulletin issued by the company: (a) metal preparation (cleaning and phosphating); (b) selection of moisture resistant primer; (c) application of a continuous primer film of adequate thickness; (d) baking or curing primer; (e) selection of proper topcoat enamel; (f) application of topcoat enamel in a continuous film of adequate thickness; (g) baking or curing topcoat enamel.

Welding Problems

HOW to overcome your welding problems and improve your welding techniques" is title of a new 8-page illustrated booklet by Eutectic Welding Alloys Corp., Flushing, N. Y. Written by welders for welders it is a practical down to earth manual designed for those who wish to increase their welding knowledge and improve their skill. A good piece to hand on to welders and supervisors in any production department.

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COMPLETE PLANT DESIGNS INCLUDING BUILDING AND EQUIPMENT
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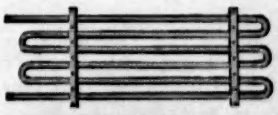
Coils and Bends of any Metal, Size or Design. Engineered to your requirements. Designed and built for longest life and the least maintenance.



Send your problems to us for engineering assistance.

REMPE COMPANY
348 N. Sacramento Blvd., Chicago 12, Ill.

Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: 20c per word; minimum 25 words. $2.00 per line for bold face headings: $15.00 per inch for line listings.

ICE PLANTS—for sale

FOR SALE — Ice plant situated on highway 61-67 at Festus, Missouri; in growing community. 80 tons of refrigeration. 2 Yorks and 1 Frick ice machines, 320- 300# ice tank with ample storage for 2000 blocks of ice. Two Fairbanks Morse 140 h.p. each, needle bearing engines. Three ice vending stations and one at plant just recently installed. Fully equipped. Desoto Dairy Ice & Supply Co., Desoto, Mo.

FOR SALE
COMPLETE COLD STORAGE WAREHOUSE

365,000 cubic foot fireproof concrete-brick warehouse. Mostly freezers — 5 car private siding. Truck dock facilities. Only plant of its kind between Pittsburgh, Cleveland and Erie. Presently filled to capacity by regular name brand storage accounts and two lease tenants. Owners are to diversified and wish to concentrate their interests in other lines of the business. Contact G. S. Warren Jr., Box 318, Sharon, Penna.

FOR SALE

COLD & FROZEN STORAGE

AND

ICE PLANT

Located between Toronto and Hamilton, Ontario, in rapidly expanding Industrial and Residential area. Thirty-five ton capacity Ice Plant, (9½ x 5½ Vilter) together with 30,000 cubic feet cold storage that could readily be converted for frozen foods.

Off season revenue from refrigeration of Arena next door.

C. W. LEASK
19 Melinda St.,
Toronto 1, Ont., Canada

FOR SALE—USED ICE PLANTS & REFRIGERATING EQUIPMENT
Complete Ice Plants 20 to 100 Tons
Ammonia Compressors, 3" x 3" to 12½" x 14½"
Condensers, Cranes, Blowers, Scoring Machines, Ice Canes—Various sizes. 100# — 300# Ice Cubers. Write or wire us on any equipment you may need.
ENTERPRISE EQUIPMENT CORPORATION
77-79 Alexander Street, Yonkers, New York
Cable Add.: ENEQCO Ph.: Yonkers 8-8118-9

USED EQUIPMENT—wanted & for sale

FOR SALE — 9½ x 9½ Vilter ammonia compressor with 100 h.p. synchronous motor, exciter and switchboard, all excellent condition. Write your needs. Born Company, 80 East Jackson Blvd., Chicago 4, Ill. WAbash 2-3299.

SPECIAL OFFER TO SELL
300 used ice cans 11½x22½x44" @ $2.50 ea.
150 ice can lids for above @ 50c ea. All material sold as is, subject to prior sale, f.o.b. Kansas City, Mo.
BROWN-STRAUSS CORPORATION
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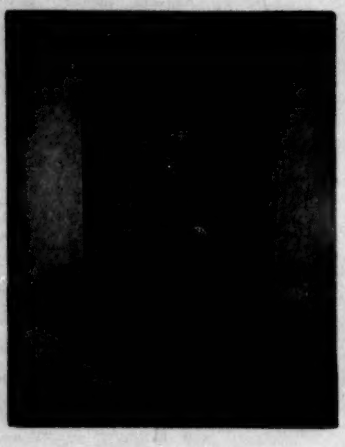

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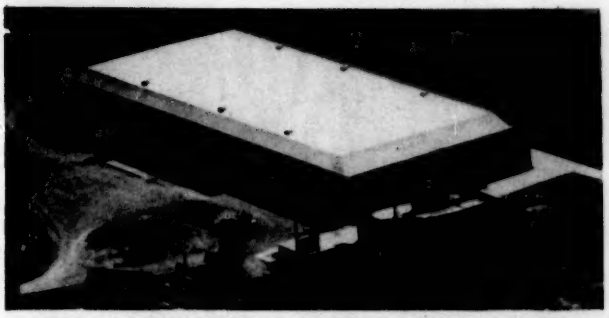

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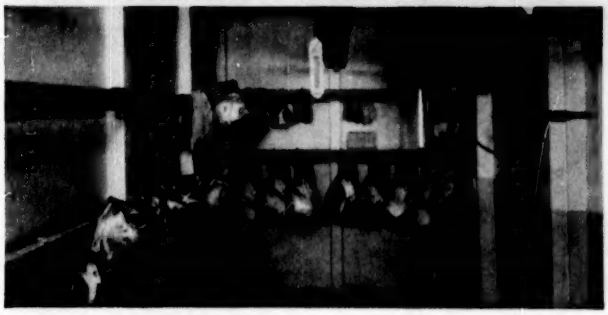

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FIBERGLAS LOW TEMPERATURE INSULATIONS

Product	Major Uses	Standard Sizes	Approximate Density	Thicknesses (Inches)
Fiberglas PF Insulation	Walls, partitions, ceilings, mechanically supported	24" x 48"	2 lb./cu. ft. 2½ lb./cu. ft. 3¼ lb./cu. ft. 4¼ lb./cu. ft. 6 lb./cu. ft. 9 lb./cu. ft. *11½ lb./cu. ft.	1, 1½, 2, 3, 4 1, 1½, 2, 3, 4 1, 1½, 2, 3, 4 1, 1½, 2, 3, 4 1, 1½, 2, 3, 4 1, 1½, 2 2
Fiberglas AE Board	Walls, partitions, ceilings, asphalt adhered	12" x 36"	6 lb./cu. ft. 9 lb./cu. ft.	1, 1½, 2, 3, 4 2
Fiberglas AE-F Board	Floors only	12" x 36"	6 lb./cu. ft.	2, 3, 4
Fiberglas Roof Insulation	Roofs above low temperature spaces	24" x 48"	11½ lb./cu. ft.	½, ¾, 1 1¼, 1½, 2
Fiberglas Dual Temp Pipe Ins.	Low temperature pipe lines	Coverage for ½" to 30" dia. pipes in 3' lengths	9 lb./cu. ft.	1, 1½, 2, 3, 4

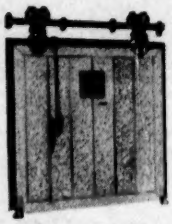
* Available in Western United States only.

How much have you been missing

by not using JAMISON'S extra services?

You may already know of the efficient performance of Jamison Cold Storage Doors . . . their ease of opening . . . their low maintenance. But do you know that Jamison also offers four valuable services unmatched in the industry?

JAMISON DESIGNS AND BUILDS ALL KINDS OF SPECIAL DOORS

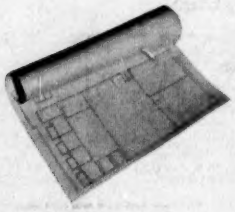


A full-time research and engineering staff enables Jamison to design and build doors for practically any special requirement. Many times, all that's needed is to modify a standard door. Whatever the need, Jamison is equipped and prepared to build any door to your order.

JAMISON HELPS CONTRACTORS TO QUOTE ON DOORS

Upon request, a Jamison representative will call upon the architect, and take off the door specifications the insulation contractor needs to quote on a job. He'll then help to interpret specifications and supply the contractor with quotations on the specified doors and any alternates that can be offered.

JAMISON ASSISTS ARCHITECTS IN PREPARING LAYOUTS

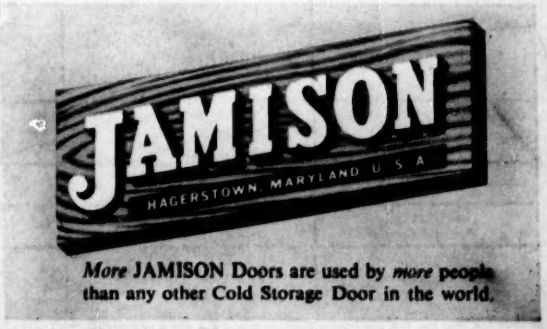


Jamison field representatives throughout the country are always available to work with architects in preparing layouts. They will help with the specifications to insure that the right door is used as well as the one most economical for the job.

JAMISON HELPS CONTRACTORS ON UNUSUAL SERVICE PROBLEMS

Jamison representatives work with contractors to provide the user the best possible service. Advice and suggestions on installing doors can frequently save service cost and trouble. Help is also available on unusual service problems.

You can depend on Jamison for both a quality product and technical service. Jamison Doors have been the standard of comparison for nearly 50 years. Jamison field service can save you time, money and worry. JAMISON COLD STORAGE DOOR COMPANY, HAGERSTOWN, MD., U.S.A.



More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.